1932

The content and organization of proposed general service courses in dairy production for agricultural college students

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THE CONTENT AND ORGANIZATION OF PROPOSED GENERAL SERVICE COURSES IN DAIRY PRODUCTION FOR AGRICULTURAL COLLEGE STUDENTS

By

Laurence B. Harmon

A Thesis Submitted to the Graduate Faculty
for the Degree

DOCTOR OF PHILOSOPHY

Major Subject Dairy Husbandry-Agricultural Education

Approved:

Signature was redacted for privacy.

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INTRODUCTION AND OBJECTIVES

Klein and others (53) show that one of the outstanding findings in the recent "Survey of Land Grant Colleges and Universities" is the fact that in these institutions, considerable attention is being given to the selection and organization of material for courses.

The present study is an attempt to select the content of material by a more reliable method than is usually employed and to organize it into general service courses in dairy production for college students.

Too frequently, subject matter is selected and organized into courses by an individual or small group of people within a school. The traditional method of organizing material is by bringing together masses of facts and general information for a particular course. As a rule, outlines and fact material are obtained from previous instructors, then supplemented with additional content by the teacher.

Many schools participated in this study. The collective judgment of large numbers of people who evaluated the objectives or needs to be sought, overcame individual interests and biased opinions and broadened the material so that it should meet the diverse needs of students interested in dairying.

In place of selecting many facts to be taught, these facts were organized in such a manner as would lead to the development of certain abilities and understandings. The

understanding of certain problems which a person meets in dairy work, and the ability to do certain things are among the most important ends sought in dairy production courses, rather than the mere learning of facts. A student's interest in a problem if present, will lead him to learn the facts necessary to solve the problem. Unrelated facts will not interest him. By designating and developing the more important abilities and understandings necessary for successful dairy husbandry, it is hoped to realize more effectively the desired ends of dairy education.

A general service course should contain material for the development of essential abilities and understandings which would be useful for large groups of dairymen located in wide geographic areas. Modifications could then be made to meet any local situation.

The development of less essential abilities and understandings can be organized into supplementary courses for the student who desires additional training in dairy husbandry. In any of the courses, the abilities and understandings can be taught in the sequence that seems most desirable.

REVIEW OF LITERATURE

1. General Curriculum Considerations

The scientific study of the curriculum is more or less a new study. According to Bobbitt, (4) the present educational program was formulated among the more simple conditions of the nineteenth century. The detailed treatment of the curriculum has been improved, although there is not a great deal of difference in the fundamentals. Bobbitt states: "A program never designed for the present day has been inherited." In considering the program, Vivian (71) says: "It just happened." Some authors say it is a matter of tradition from which we dare not venture.

"The day is past when school men can sit down at a desk and make a curriculum for a school." (4). The work of reorganizing the curriculum is sometimes the work of months of study and careful pooling of interests and leadership.

For more than a century, the educational literature has been full of dissatisfaction with tradition and practice in the selection of subject matter for the curriculum. The gap between the curriculum, life problems, and the needs of the learner has been paramount. (42). Rugg and Shumaker (65) say that a wide gap between materials of instruction, the needs of American life, and the needs and interests of the child existed before 1890, while only a piece-meal adminstrative reorganization of the schools system between 1890-1928 resulted from the efforts of school adminstrators, educational

scientists, and the so-called progressive educational group.

The techniques that are used in curriculum construction today are largely in the field of secondary education. Good (41) suggests the principles and procedures that are applicable on the college level.

Cocking (19) states: "As the development of the curriculum is traced, reference to the work of the national committees, appointed by the National Educational Association, can not be omitted. These committees began to function shortly after 1890 and have exercised a great effect on the making of the school curriculum. Among the most prominent of these should be mentioned the Committee of Ten, 1893, headed by Dr. Charles Eliot of Harvard, which dealt with the problem of secondary education, the Committee of Fifteen, 1893, which dealt with the reorganization of the elementary curriculum, and the Committee on Reorganization of Secondary Education, 1920..... These committees have been singularly fortunate in their personnel. The results of their work have shaped to a marked degree the whole development of the curriculum in the last quarter of a century."

The National Educational Association appointed a committee to work on the articulation of the high school and college. The committee made their report in 1911. This committee was continued for a period of years, although the personnel changed somewhat. In 1918, the committee (61) made another report on the reorganization of secondary

schools. The committee presented the following objectives of education:

1. Health
2. Command of fundamental processes
3. Worthy home membership
4. Vocation
5. Citizenship
6. Worthy use of leisure
7. Ethical character

These cardinal principles have been accepted as the standards of secondary education and have possibly had considerable influence in higher institutions. In order to determine the effect which these principles have had in the field of secondary education, a study was made by the National Association of Secondary School Principals in 1925. (24). A questionnaire study showed that schools had made adjustments in the selection of material in organizing their curricula.

Bode (7) organizes material into logical and psychological divisions. He says: "A logical organization aims to arrange knowledge in such a way as to show the relation of premise and conclusion." Concerning psychological organization, he states: "This kind of organization lacks the purely objective, detached, impersonal quality of pure knowledge. Its center of reference is the individual learner."

II. Selection of Content

Briggs (9) says: "No superintendent, principal, or teacher can proceed far with intellectual plans of the curriculum

until he has decided what is to be taught."

Regarding the selection of subject matter for the curriculum, Charters (14) says: "A statement of aims is a prerequisite to both selection and use." He continues by saying that every writer on the curriculum has made an arbitrary leap from the aim to the subject matter without providing adequate principles such as would bridge the gap, without presenting steps which irresistibly lead us from aim to selection of material. Charters points out that Herbert Spencer anticipated the modern trend of education when he expressed a demand for more objective materials in the field of curricular work.

In discussing the problem of determining the subjects or units to be included in a curriculum, Cocking (19) states that there is little which is scientific or objective which will aid the curriculum maker. He says it is a matter of judgment, and until scientific investigations have been carried on a much longer period of time, it cannot be said with a fair degree of finality that a particular subject or unit best satisfies a particular need or aim. He further says: "Until that time comes, expert judgment based upon as many factors as possible will seem to give the best solution in selecting subject matter for the curriculum."

In order to make known the values of content, a statement of aims or objectives is essential. At the thirty-ninth annual convention of Land Grant Colleges in 1926, Johnson (50)

presented four aims for the selection of material. They are as follows:

1. To prepare students for farming occupation.
2. To equip students with a broad education throughout life.
3. To develop rural leaders.
4. To serve society.

These objectives show that curricula should be selected which will not only develop an individual to be an efficient farmer, but also give him a broader vision of his social life and make him able to take his place as a leader in the community.

Mann (56) designates the aims and organization of the agricultural college as (1) the determination of the major aims of college work, (2) meeting situations within the several divisions of the general field, (3) the organization of curricula appropriate to the representative segmental groups, (4) the determination of the content and organization of subject matter courses of instruction and (5) developing methods of teaching the subject courses appropriately.

In determining the content of material to be taught in college, Klein (54) says that it is the task of the college instructor to solve the problems of higher education so as to reconcile and serve the diverse needs and demands of a modern society. Klein presents some tendencies of higher education which have influenced the content of the curriculum. These are (1) the tendency to carry on in the same old way; (2) the tendency of institutional adminstrations to relieve the staff

from restrictions by liberalizing organizations and regulative processes; (3) the tendency to substitute the mechanical science of education for reliance on the creative genius that should dominate college education.

The agricultural colleges were established after the passage of the Morrill Act in 1862. At that time very few text books in agricultural subjects or materials of any kind were available for instructional purposes in the school. The need for content of material and books became an immediate need.

Selection of subject matter for the earlier books in science was largely determined by scientific men from the point of view of subject matter itself. The individual student, his needs, abilities, and interests, received very little attention. The experiences of teachers and lay members out in the field were given very little consideration when this content was assembled in text book or course form. This condition was pointed out by Rugg (64) in discussing the three causes of the lag of curriculum construction which he gives as follows: "The first is that American life has moved in two quite separate streams--practical and cultural. The second cause is that of the academic orientation of the professors who wrote the text-books. The third cause is the entrenchment of authors and text-books in the curriculum."

Hopkins (46) says that in selecting content, certain criteria are essential to determine what should be selected or

rejected. Content that can stand the test of these criteria and at the same time meet the aim which has been set up for the subjects, may be considered to be well selected. Content that can not meet the requirements of these criteria should be rejected. The criteria are given below.

"Good content should

1. Have high frequency of occurrence in the common activities of present social life. For this reason it ought to be taught by the schools.
2. Have high frequency of occurrence in the common activities of present social life, but not be taught by any outside social agency.
3. Have high frequency of occurrence in social life as it ought to be in the next generation.
4. Be of interest to pupils.
5. Serve as the basis for acquiring more learning.
6. Be within the capacity of individual pupils.
7. Be within the training and experience of individual pupils.
8. Be of value in meeting the basic needs of a possible future career.
9. Include only those topics of the greatest relative value out of the total possible range of topics.
10. Include an intensive treatment of a small number of topics rather than an extensive treatment of a larger number of topics.
11. Include the same topics or activities in the same subject in succeeding grades, only when there is new material, a new emphasis, a new objective, a new approach, or a new outcome.
12. Be selected in such a way as to contain the maximum amount of the most desirable indirect content.
13. Make possible the maximum correlation with other subjects.
14. Be selected for its value in reaching the objective as determined by scientific experimental studies."

These criteria were rated by 476 successful teachers. Numbers 1, 2, 6, and 4 were rated as being of greatest importance in the order named. Numbers 13, 10, 9, and 12, in order were rated as the poorest criteria.

Parker (59) advocated that the content of the curriculum should be adapted to the social need which varies historically between different communities, and between different groups of students within the same community or institution. He discussed the selection of topics or units of greatest value for the curriculum by making an intensive study of a few topics, rather than an encyclopedic treatment, and determination of the teaching order of the units on the basis of the needs, capacities, and interests of students rather than on the basis of the subject matter itself or the interests of a specialist in the subject.

Klein (53) gives two methods of selecting content for courses:

1. Curricula with certain aims or objectives and courses outlined and arranged to give the desired material in the proper place.
2. Curricula built out of the courses already offered by the various departments, those being used that seem to be closely related and contribute to the type of material that is desired in the curriculum.

"The former plan would be the most desirable, but more institutions use the latter plan." (53).

Hultz (48) says that an examination of the changes in agricultural college catalogues indicate clearly that animal

husbandry departments have been giving considerable thought to curricula. Through a survey of twenty-nine land grant colleges, Hultz shows that over sixty percent of the graduates in animal husbandry go back to the country as stockmen, county agents, or agricultural teachers. It would seem then that the subject matter of the animal husbandry courses should be so selected as to prepare the student for the work that he will be expected to do.

In the recent survey of Land Grant Colleges and Universities, (53) a study was made of the various methods in preparing course outlines which were used by the colleges. The methods used are indicated as "guides". The report is quoted below:

"Guide used	Number of institutions
Study of the curricula of other colleges	38
Analysis of occupations of graduates and former students	37
Staff discussion of objectives of agricultural training	34
Study of elements of basic sciences essential to understanding of the technical courses	33
Analysis of the agricultural industries of the state	30
Study of range of opportunities in agricultural occupations and their frequency	26
Systematic inquiry of agricultural graduates as to the purposes college training should meet	20
Study of reasons for which students abandon the study of agriculture	12
Study of the non-technical activities of those in agricultural vocations	9
Study of the causes of failure in agricultural vocations	6"

Klein (53) presents a general method for the routine and general procedure which seems to be most generally used in the preparation of course outlines in colleges. The procedure varies with different schools, but usually is as follows: "The individual teacher prepares an outline of the material to be presented in a course, together with texts or references that will be used, and indicates the number of hours of class-room work required per week. This is reviewed by the department head and is submitted by him to the dean, who may refer it to a committee of the agricultural staff or the staff as a whole for approval and to an institutional faculty committee or institutional faculty for final approval. In some cases, it is referred from the dean or from the agricultural committee or staff direct to the institutional faculty."

To develop a standard by which the selection of all subject matter could be resolved would be quite impossible. The content of courses in one section would not necessarily be suitable for another. Certain general principles, however, may be basic to them all. In discussing this particular point, Coffin (21) states that the advisability of providing minimum essentials--embodying those common elements which are necessary for mutual intercourse--is no longer a matter for academic discussion. Although local communities should adapt the curriculum to meet their needs, a core of material should be common to all. (24).

Since the establishment of the land grant colleges, certain changes in content and curricula have taken place. These trends are possibly somewhat similar in various departments of the colleges. In studying these trends, the survey of Land Grant Colleges (53) for 1930, reports that the agronomy departments have been weighed and studied more than other departments in the agricultural group. "The major trends that have taken place since 1880 have been the gradual elimination of foreign languages as a requirement, and the reduction of the requirements in mathematics, physics, and chemistry, and increases in economics and in electives. Electives have increased in larger proportion than the decrease in credit hours in the subjects specified."

Strong and Uhrbrock (70) used the method of job analysis in industry to select content. They give four general methods of collecting data as follows:

> The job analyst may choose to observe the employee and put the results of his study in the form of a written job specification; he may elect to take the job himself, perform all the duties and operations involved, analyze his own activities and record the results; he may interview the worker and the worker's superiors and record the facts he learns. Or he may use a combination of all the methods stated above."

At the annual meeting of the Land Grant Colleges in 1923, Dean Vivian (71) pointed out how to determine the curriculum best suited to meet the needs of the agricultural students. He says: "The man who undertakes to change in any way the college curriculum must approach the subject with prayer and fasting." Vivian continues by saying that there

is very little scientific foundation for our present curricula. He lists eleven job analysis units which he classifies under the headings of abilities, understandings, knowledges, and planning. He states that there is, however, no scientific way to build a curriculum except to base it upon a complete job analysis of the objectives. He proposed that a committee be appointed to work out as a project, the agricultural curriculum with different colleges working on various units. The suggestion was accepted.

The special committee (71) made the following report:

> "Resolved, that this association adopt the proposals put forward in the paper by Dean Alfred Vivian for a comprehensive study of the objectives in college instruction in agriculture, and an analysis of the determined objectives in terms of their requirements in building in collegiate agricultural instruction.
>
> "Resolved, further, that the association authorize its president to appoint a committee, at least one of whose members is experienced in the technique of job analysis, which shall present to the association at its next annual meeting a workable plan for such a study and providing for the participation of the several colleges in its prosecution."

Charters (14) shows the method employed in making a job analysis.

> First, introspection; this method is used by a person already familiar with the job whose duties are to be analyzed.
>
> Second, interviewing; to be used when one is not familiar with the job. A list of duties is obtained. Later, a man in authority who knows the job checks the list and adds whatever items have been left out.
>
> Third, working on the job; a person works on the job, carrying through the operations. This method requires a great amount of time.
>
> Fourth, questionnaire; care must be taken in its use.

III. Organization of content

To collect content of material is of little value unless it is organized in a usable form.

Hopkins (46) says that after content has been selected, it must be organized in such a way as to promote the most effective methods of teaching in order that the content may contribute the greatest possible use in achieving the aims. Put in another way, the most effective teaching of the content must necessarily carry the individual with the greatest certainty and despatch toward the aims. Without organization of content, method would be ineffective. According to Hopkins, content must be organized so as to

1. Proceed from the psychological to the logical.
2. Be of maximum good to the extent to which it is pursued.
3. Permit no sudden break in the progressive development toward the aim.
4. Promote economy in learning.
5. Provide the most desirable grade placement.
6. Meet individual differences in capacity.
7. Provide for individual differences in previous training.
8. Care for the probable future destinies of individual pupils.
9. Provide definite divisions for instructional purposes, such as projects, problems, units, and movements.
10. Show the relative value of topics in achieving the aim.
11. Indicate the range and degree of efficiency expected in outcomes.
12. Permit the best use of textbooks.
13. Provide for maximum correlation with other subjects."

In organizing content into courses, that material which a student learns outside of school should not be included.

Hamlin (44) says: "In the case of farm engineering, we have been emphasizing mainly in our school shops the type of work which farm boys learn to do anyway while neglecting the proportion which the school only can teach. We have killed the interest of the pupils and parents by too much mulling over the commonplace more easily and effectively acquired outside of the school than in it."

Wiseman (78) says that students learn a great many things outside of school. When they enter school, they should not be required to study those things which they already know, unless some new application, use, skill, or device can be added that will aid them in performing more efficiently the things they are already able to do or understand.

Dickinson (26) did not include the material students already knew when he developed his content for vocational students. In his study, Dickinson determined the content of a dairy husbandry course by checking the content in five dairy husbandry text books and checking the files of farm papers. The list of content was checked by instructors and farmers to determine what was of greatest value. An examination was given to relatively large numbers of vocational students to determine the material with which they already were familiar.

Overall (58) made a study of the objectives in dairy husbandry at Tennessee Polytechnic Institute. A questionnaire listing the interests, ideals, and abilities to be

taught was sent out to 25 teachers, 25 county agents and testers, and 100 outstanding dairy farmers. On the basis of the recorded scores, Overall developed a problem series for dairy husbandry. Byram (12) uses problems for a course of study in hogs and dairy cattle for vocational agriculture. Lancelot (55) gives the technique of making problems and problem series.

In explaining how modern business influences course content, Judd (51) shows that lumbermen, bankers, and coffee producers determined to print leaflets concerning these business phases and placed them in the schools.

Otis W. Caldwell (13) in determining what to teach in biology examined 492 daily newspapers from various sections of the country and noted the content of biological material. 3,061 articles were noted with a total of 14,000 pages of material. These were classified under the following heads: Health, biology, infectious diseases, dietetics, drugs, first aid, and physiology. These were further subdivided.

Sexauer (67) made a study of the major activities of dairy farmers of New York as a basis for a curriculum in dairy husbandry.

Buckton (10) made a survey of the Jordan, Iowa, district and the Northfield, Minnesota, community to determine the problems met by the farmers in the districts. He says that after determining the problems with which farmers are con-

fronted, the necessary content can be organized to meet those needs.

The curriculum workers in the trades were among the first to use job analysis methods in determining course content. Allen (2) shows the development of courses for printers.

The Federal Board for Vocational Education (37) has made numerous studies to determine the content of various vocational courses. One study, an analysis of the operative jobs of a corn-growing enterprise, was made in 1927. In the preparation of this study, a number of farmers were interviewed in four of the leading corn-producing counties of Maryland for the purpose of studying their practices in corn growing and with a view to finding a fairly representative farm situation which might be used as a basis for a type study. Members of the agricultural college and extension staffs of the University of Maryland and specialists in the United States Department of Agriculture were consulted with reference to the inclusion of certain improved practices not commonly followed in Maryland.

The study is particularly intended to serve as an illustration of procedure in analyzing operative training content of farm jobs.

The following jobs were studied:

1. Final sorting of seed corn
2. Testing seed
3. Shelling seed
4. Plowing the land
5. Harrowing

6. Planting
7. Cultivating
8. Collecting and storing seed in the fall
9. Cutting corn
10. Husking corn

Each job was taken up from the standpoint of operations, practices, and related information.

Similar studies were made by the Federal Board in other subjects. They are as follows: Vocational agriculture, based on analysis of the business of selected farmers in Kentucky (38); Analysis of special jobs in quality of milk production (40); Management of a cotton-growing enterprise (35); Making the vocational course of study in agriculture in high school (34); Management of a farm business (33); Poultry enterprises (32); Potato enterprise (31); A unit course in swine husbandry (30).

The report of the Committee on Standards (63) appointed by the North Central Association on standards for use in the reorganization of secondary school curricula, made a report on the objectives of secondary education. The objectives or goals were grouped under two heads: First, the ultimate goals toward which all educational endeavor is directed; second, the more specific or immediate objectives which serve directly and in determining emphasis and neglect in teaching. The ultimate objectives of secondary education are presented in terms of dispositions and abilities. "Dispositions are complex and relatively permanent mental and emotional sets or trends of the individual." "Abilities are complex processes

or powers subject to further subdivision or analysis, as for example the complex ability of the power to read in a native or foreign language, or the power to execute a complex performance." (63).

The ultimate objectives stated in terms of dispositions and abilities are reported as follows by the committee (63):

"1. To maintain health and physical fitness.
2. To use leisure time in right ways.
3. To sustain successfully certain definite social relationships such as civic, domestic, community, and the like.
4. To engage in exploratory-vocational and vocational activities."

The immediate objectives may be summarized as follows:

"A. Acquiring fruitful knowledge.
   1. Preparatory to acquiring other knowledge.
   2. Knowledge which functions directly in developing dispositions and discovering and developing abilities.
   3. Knowledge which is useful in control of situations of every-day life.
B. Development of attitudes, interests, motives, ideals, and appreciation.
C. Development of definite mental techniques in memory, imagination, judgment, and reasoning.
D. Acquiring right habits and useful skills."

"Ultimate objectives are stated in terms of dispositions and abilities, while immediate objectives must be thought of in terms of acquiring and developing."

Charters (14) sets up the principles of curriculum construction rather from the point of view of activity analysis. He suggests the following objectives:

> First, determine the major objectives of education by a study of the life of man in its social setting.
> Second, analyze these objectives into ideals and activities and continue the analysis to the

level of working units.

Third, arrange these in order of importance.

Fourth, raise to positions of higher order in this list, those ideals and activities which are high in value for children but low in value for adults.

Fifth, determine the number of the most important items of the resulting list which can be handled in the time alloted to school education, after deducting those which are better learned outside of school.

Sixth, collect the best practices of the race in handling these ideals and activities.

Seventh, arrnage the material so obtained in proper instructional order, scoring to the psychological nature of children."

Lancelot (55) says that the teacher is expected to determine what should be taught and that a separation of essential from non-essential material is necessary. He gives the following technique to be used in separating essential from relatively non-essential material:

1. Make a list of the large, specific interests, ideals, abilities, and appreciations, which you wish your course to develop in your students.
2. Refer to texts, bulletins and other similar sources for fact material that will clearly prove of value in developing the specified interests, ideals, abilities, or appreciations. By the method described below, arrange those facts which seem of value in two lists, the first containing those which are to be so taught that they will be retained, and the second containing those which students should merely be able to find and use.
3. To determine in which list a given fact should be placed, score it as to (a) interest, (b) understanding and (c) usefulness. In scoring each of these, use the scale of 0 to 5.
4. In case the total score on any given fact is 10 or more, regard it as an essential fact to be taught so that it will be retained until needed, and place it in the first list named above. If the total score is less than 10, place it in the second list; or if its score is very low, as will often be the case, discard it altogether.

5. In case the list of essential facts suitable to use in developing any given interest, ideal, ability or appreciation is found to be insufficient, search without ceasing for others of the desired type until a sufficient number is found.

In determining the objectives or principles of curriculum construction, Bobbitt (5) suggests a modification of the seven cardinal principles. He submits the following:

1. Language activities; social intercommunication.
2. Health activities
3. Citizenship activities
4. General social activities
5. Spare time activities
6. Keeping one's self mentally fit
7. Religious activities
8. Parental activities, the upbringing of children, the maintenance of a proper home life.
9. Unspecialized or non-vocational practical activities
10. The labors of one's calling

Bobbitt divides each of the above principles into a great many abilities.

The curriculum study by Bobbitt (6) in Los Angeles was developed through large committees of teachers. The teachers listed approximately 600 desirable abilities and characteristics which were presented to 1,200 high school teachers of Los Angeles, from which they were to select those which applied to specific subjects in the curriculum. These were then divided into ten fields. Charters (16) describes the study of the Los Angeles curriculum by Bobbitt, as follows: "The most significant and elaborate attempt that has yet been made in high school curriculum organization." Snedden (68) says: "Professor Bobbitt's exceptionally valuable

contributions are these: 'First, the use of descriptive words and phrases denotive of human abilities and characteristics which are not derived from, or otherwise visibly based on, the traditional school subjects.'". Snedden finally concludes: "It is the largest and most important work now before education."

In considering the construction of the Agricultural curriculum, Bobbitt (4) says: "The curriculum discoverers will go to the farms that are most productive and most successful from every legitimate point of view." Bobbitt (6) does not rely upon scientific analysis but upon the "Common judgments of thoughtful men and women," for the determination of desirable abilities as educational objectives. He says that human life, however varied, consists in the performance of specific activities. Education that prepares for life is that which prepares definitely and adequately for these specific activities. However numerous and diverse such activities may be for any social class, they can be discovered. This requires only that one go out into the world of affairs and discover the particulars of which these affairs consist. These will show the abilities, attitudes, habits, appreciations, and forms of knowledge that men need. These will be the objectives of the curriculum.

The selection of content to be taught seems to be for the purpose of making those changes within an individual that will accomplish the aims of education. These changes should be the attainment of ideals, interests, attitudes, appreciations, skills, and abilities that will make him a more useful and efficient citizen. Charters (14) selects material to accomplish these purposes through studying the activities of individuals. Lancelot (55) suggests the separation of essential from non-essential material and the organization of this content into life situation problems for teaching. Bobbitt (4), (6) selects content from the activities of people and organizes this content into abilities, knowledges and skills. He uses abilities, however, in most instances.

THE INVESTIGATION
METHOD OF PROCEDURE AND RESULTS
Obtaining material

In selecting and organizing content for general service courses in dairy production for college students, the first problem was to obtain content which would be adequate and suitable. The content was obtained from the literature and from the course outlines of dairy production classes in the agricultural colleges.

A letter was sent to the heads of the dairy husbandry departments in each of the land grant colleges, telling them of the proposed study and asking them if they would be willing to cooperate in the work. The departments were also asked to indicate whether or not they had available outlines of dairy production courses which they would be willing to submit for consideration in the study that was being attempted. The letter which was sent out to the schools is presented here.

DAIRY HUSBANDRY SUB-SECTION
Iowa Agricultural Experiment Station
Ames, Iowa

(Copy of the letter which was sent to the Heads of the Dairy Husbandry Departments)

Letter No. 1.

Dear Sir:

In connection with a doctorate thesis, I am making a study of the contents of college courses in Dairy Husbandry. In order to proceed with the work, I desire to get your cooperation in furnishing me with some information. A summary of the findings will be gladly furnished you should you desire to get them.

Very little work has been done in this field and there seems to be a need for such a piece of research. Names of schools will not be used in reporting results.

Will you be willing to aid by furnishing me some information from your school? Please check, Yes____; No,_____.

Do you have outlines giving contents in any of your courses in Dairy Husbandry that you would be willing to let me use for a week or two? Please check, Yes,____; No,____. These outlines would be returned to you promptly if you so desire.

Please list your catalogue numbers and names of courses for which you have outlines.

Thanking you for your cooperation in this study, I am,

Approved:

Yours very truly,

C. Y. Cannon

Chief in Dairy Husbandry

L. B. Harmon

Graduate student in Dairy Husbandry

Replies from schools indicated that 44 colleges were willing to cooperate in the study. There were 20 colleges that offered to furnish outlines of their dairy husbandry courses.

A copy of the letter which was sent out to the heads of the dairy husbandry departments, asking them to send copies of their available outlines is given here.

DAIRY HUSBANDRY SUB-SECTION
Iowa Agricultural Experiment Station
Ames, Iowa

(Copy of the letter which was sent to the Heads of the Dairy Husbandry Departments.)

Letter No. 2.

Dear Sir:

I appreciate your willingness to cooperate with me in a study of the contents of College Courses in Dairy Husbandry, as indicated in your reply to my letter of June 18th.

Could you please furnish me with outlines of at least one or two of your courses, in fact I would appreciate receiving as many as you can conveniently let me have at this time. The more the better. Some schools have already sent me mimeographed, typewritten, or printed forms, which are very satisfactory if you have them.

I should like to be permitted to keep the outlines you send me in order that I may have them for use and reference as I proceed with the study. However, if you need or desire the outlines returned to you, I shall do so at the time you specify.

Thanking you for your cooperative interest and spirit, I am

Yours very truly,

LBH*D

L. B. Harmon

Graduate Student in Dairy Husbandry

Approved:

C. Y. Cannon

Chief in Dairy Husbandry

Outlines of Courses

Seventeen schools sent in their outlines from the list of 21 who had previously states that outlines were available. Some of the outlines that were returned, were in considerable detail, while others were more general in nature.

Inasmuch as the present study deals only with dairy production, just those outlines or portions of them which dealt with this subject were used. The catalogue number of the course, the name of the course, and the institution from which each outline was received is given below, also a list showing the number of outlines that were received from each state.

Table 1.
COURSE OUTLINES USED IN PREPARING MASTER OUTLINE

Number of course	Name of Course	School
D.H.222	History and Development of Dairy Breeds	Virginia
D.H.334	Dairy Breeds, Pedigrees, and Records	Virginia
A.H.405	Dairy Cattle Breeds	Ohio
A.H.300	Advanced Study of Dairy Breeds	Iowa
106 W	Dairy Cattle Breeds and Breeding	Missouri
D.H.25	Breeds of Dairy Cattle and Theory of Judging	Pa.
	Advanced Study of Dairy Breeds	Wyoming
A.H.615	Advanced Dairy Cattle Judging	Ohio
104 W	Dairy Cattle Judging and Selection	Missouri
341	Breeds and Judging	Tennessee
A.H.5	Dairy Cattle Judging	Vermont
313	Dairy Farming	Tennessee
D.H.2	Dairy Farming	New Jersey
D.H.1	Principles of Dairying	Nebraska
A.H.40	General Dairying	Wyoming
D.111	Dairy Cattle	Oklahoma
A.H.1f	Elements of Dairying	Missouri
A.I.23	Dairying	Kentucky
D.H.211	Dairying	Virginia
D.H.24a	Dairy Husbandry	Illinois
D.H.20	Dairy Husbandry	Illinois
101	Dairy Fundamentals	Alabama
D.H.21	Dairy Husbandry	Illinois

D.H.24a	Elementary Dairy Husbandry	Illinois
D.H.24b	Dairy Husbandry	Illinois
401	Milk Production	Alabama
A.H.612	Milk Production	Ohio
	Dairy Production	Missouri
A.H.604	Dairy Cattle Production and Management	Ohio
D.H.103	Dairy Management	Washington
A.H.6	Dairy Herd Management	Vermont
D.H.27	Dairy Cattle Management	Pennsylvania
310	Dairy Herd Practice	Iowa State
D.H.25	Dairy Cattle Feeding and Management	Pennsylvania
D.H.333	Feeding Dairy Animals	Virginia
	Dairy Cattle Feeding and Management	Wyoming
A.H.312	Milk Production	Iowa
103 W	Market Milk and Milk Inspection	Missouri
D.H.10	Market Milk	Pennsylvania
D.H.414	Dairy Cattle Feeding	Pennsylvania
A.H.311	Dairy Cattle Feeding and Management	Iowa State
D.H.2	Animal Nutrition	Connecticut
A.H.218	Animal Nutrition	Iowa State
313	Milk Secretion	Iowa State
203f	Milk Secretion	Missouri
A.H.404	Dairy Cattle and Milk Secretion	Ohio
D.H.4	Animal Breeding	New Jersey
A.H.20	Animal Breeding	New York
A.H.250	Animal Breeding	Iowa State

Table II. Outlines submitted by the various states.

State	No. of Outlines
1. Alabama	2
2. Connecticut	1
3. Illinois	5
4. Iowa	7
5. Kentucky	1
6. Missouri	6
7. Nebraska	1
8. New Jersey	2
9. New York	1
10. Ohio	5
11. Oklahoma	1
12. Pennsylvania	5
13. Tennessee	2
14. Vermont	2
15. Virginia	4
16. Washington.	1
17. Wyoming	3
Total	49

The Master Outline

All of the outlines which were received from the schools were organized into one outline, designated as the "Master Outline" so that the material from all was readily accessible under its headings and sub-headings.

Fifteen main headings were arbitrarily chosen to facilitate the recording of the content of the various outlines into the master outline.

The necessary number of sub-headings were placed under each main heading. The fifteen main headings that were used are as follows:

1. The development of the dairy heifer into a cow.
2. Selection of individuals.
3. Importance of dairying.
4. Maintaining the health of the herd.
5. Milk and its products and means of handling.
6. Calf raising.
7. Dairy barns, silos, and other structures.
8. Care and management.
9. Farm management, associations, business phases.
10. Animal breeding.
11. Nutrition and feeding in relation to milk production.
12. Milk secretion.
13. Starting the dairy herd and selection of a breed.
14. Judging and showing dairy cattle.
15. Origin, dairy type, breeds of dairy cattle.

Any particular point was recorded but once in the master outline, even though it was given in several outlines. For example, although the "Use of skim milk for feeding dairy calves" was contained in several outlines, it was recorded

but once in the master outline. No attempt was made in the recording process to determine the number of times each point was found in the different outlines.

Selection of Material from the Master Outline

The selection of material from the master outline was made (1) on the basis that it would develop "abilities" on the part of the individual to do certain kinds of activities or jobs, (2) on the basis of "understandings" of certain principles, laws, or truths that a person should know in order to solve the problems with which he is confronted.

Abilities and understandings were selected because they are probably the chief ends in education for which we are striving.

The acquisition of facts, or information, does not seem to be the end in itself. On the other hand, the true ends are the uses that will result from this material. The desirable changes that are brought about in the individual are the things which are most important. These changes are the ideals, interests, attitudes, habits, appreciations, abilities, and understandings that are developed within an individual. When desirable ends like these are developed, education has fulfilled its purpose. Facts are often taught without attaining these ends.

The things we should strive for in the teaching process in dairy production are: (1) the ability to do those things

which a successful dairy farmer has to do. Those of greatest importance should be among the first to be taught. (3) An understanding of the different laws, truths, or principles which are necessary in order to solve the problems which the sucessful dairy farmer meets in his work. If our dairy education can achieve these ends, it is possible that we shall more nearly accomplish the things that are desired.

If we consider the acquisition of knowledge as the end of educational activity, the person may be at a loss to know how it is to be applied. On the other hand, if we consider the abilities and understandings as the ends, then the facts that are necessary to develop the ability or understanding are applied directly in the problem. From this point of view, the student has a clearer understanding of the values and uses of the facts and information which it is necessary for him to get.

The acquisition of facts has been and probably will continue, in too many cases, to be the end most commonly sought in our colleges. Some schools are already using some of the ultimate and real objectives, the development of the abilities and understandings.

Hultz (48) pointed out that 60% of the graduates in animal husbandry go back to the country as stockmen, county agents, or agricultural teachers. It would seem reasonable to say that these men should be able to solve the problems of the dairy farmer. Vivian (71) classified job analysis units or work in agriculture under the headings of abilities, understandings,

knowledges, and planning. Bobbitt (6) organized the curriculum in the Los Angeles schools under abilities. The North Central Association (63) in its reports on standards for the various secondary school subjects, net up the ultimate objectives of the courses in terms of abilities. Lancelot (55) says: "The acquisition of knowledge is not to be regarded as the true end of teaching but only as a means to the true ends, which are in general, interests, ideals, abilities, and appreciations." Elsewhere he states: "That the knowledge to be taught in our courses is actually to be determined by the ends to be attained; that when these ultimate ends have been specified, and not until then, may the fact material to be taught be intelligently chosen, and that no knowledge should be taught that does not contribute clearly and directly to one or more of the specified ends that are to be realized."

Determining the Abilities and Understandings in the Master Outline

The selection of the abilities and understandings from the master outline was made by determining the end products that the content of the master outline would probably develop. By a process of deduction, these abilities and understandings were identified which seemed to be implied by the content of the master outline.

If material is to be used in the development of some ability or understanding, it must have some justification for its use. The criteria for selecting this content are based

upon the understanding of the content in solving the problems and its usefulness to the general dairy farmer. For example, an understanding of the process of digestion and the relative digestibility of different feeds should help one to feed the kind and amount of feed that an animal needs. It would also aid him in selecting the cheapest feeds that would meet the requirements of the animal. Some of the content which was taken directly from the master outline is presented here in order to show how the abilities and understandings were determined.

Selection of a Breed

1. Factors to consider
   - (a) Breed of cattle most common in community
   - (b) Form in which product is to be marketed
   - (c) Average production of milk and fat
   - (d) Original cost and probable demand for surplus stock
   - (e) Climate, food, and water supply
   - (f) Topography of farm
   - (g) Economy of production of milk fat
   - (h) Breeding qualities of cows
   - (i) Vigor of calves
   - (j) Beef value of discarded cows and adaptability of calves for veal
   - (k) Preference of breeder
2. Necessity for selection
3. Relative efficiency in individual cows
4. Variation in individual animals
   - (a) Causes of variation
5. Economy of high production
   - (a) Reasons for greater economy
6. Methods of selection
   - (a) Breed
   - (b) Type
   - (c) Pedigree
   - (d) Proven sire
   - (e) Age
     1. dam
     2. sire
   - (f) linebred
   - (g) inbred

An inspection of this material from the master outline

showed that it presented facts concerning the characteristics and qualities of breeds of cattle. A determination was made as to the use this material would be to the dairy farmer.

The breed of cattle most common in the community can be determined by an inspection or survey of the community. If one knows whether milk is to be sold as market milk, or for butter, cheese, or condensed products, it will aid him in selecting cows for that particular purpose.

An understanding of the production of different breeds will enable one to choose more wisely the breed best suited for his purpose.

By examining the other factors which are concerned in selecting a breed and noting the methods of selection, it is quite evident that this content will help a farmer to understand the various problems encountered in choosing a breed, and by the use of the various methods, the selection can be accomplished.

This content points to a definite need by the dairyman of "An ability to select a breed appropriate for a given condition." This was the manner in which the ability named above was determined. It appears as No. 99 on the questionnaire.

All of the content in the master outline was examined in this manner and 147 abilities or understandings were determined.

After determining the abilities and understandings from the master outline, the question arose as to which ones were really most important from the standpoint of the general dairy farmer.

The Questionnaire

The questionnaire used in this study is merely a list of abilities and understandings which were sent out to be evaluated.

The 147 abilities and understandings which were selected from the master outline were organized into a list for scoring.

This list was arranged in such a manner that written answers were not required on the part of the person answering it. Three vertical columns were provided for A, B, and C scores so that a check mark could be made in one of the three, opposite each ability or understanding.

The person was instructed as follows: "If the ability or understanding is absolutely necessary to success in dairying, place a check mark in the Column "A". If the ability or understanding is important but not absolutely necessary to success in dairying, place a check mark in column "B". If the ability or understanding is of minor value for success in dairying, place a check mark in column "C"." An example of the method of checking the questionnaire was given with the directions. Finally the person was asked to score the abilities and understandings in the questionnaire from the standpoint of their value to the general dairy farmer whose major interest was dairying.

Preliminary Evaluation of the Abilities and Understandings

A preliminary scoring of the abilities and understandings was made by a group of graduate students, dairy extension men,

herdsmen, and professors of dairy husbandry before the questionnaire was sent out in its final form. Slight changes in wording to clarify meanings of abilities were made following the preliminary scoring, as a result of the criticisms which were received from the group, and a final draught of the questionnaire was made to be submitted to a selected group of dairy specialists.

Selection of the People to Evaluate the Abilities and Understandings

Reliable judgment in determining a value is best obtained from large numbers of people who are specialists in the field in which critical evaluation is desired. The persons selected to determine which abilities and understandings were the most important were college professors in dairy husbandry, dairy extension men, county agents who were particularly active in dairy work, successful dairy farmers, and college graduates from dairy husbandry departments. These men were selected from all parts of the United States in order that all sections should be represented.

The names and addresses of these people were requested from the heads of the dairy husbandry departments in all of the land grant colleges. These were to be as follows for each state:

1. Fifteen successful dairymen, five of whom were to be graduates from dairy or animal husbandry departments. It was suggested that names of graduates engaged in other phases of dairying be submitted if five could not be secured who were dairy farmers

2. Two county agents who were particularly interested or trained in dairying.
3. Two state dairy extension workers or dairy specialists.

The heads of the dairy husbandry departments were asked to select people who would probably answer a questionnaire and to enlist their cooperation in this problem.

A copy of the letter which was sent to the heads of the dairy husbandry departments, asking for these names and addresses is given here.

DAIRY HUSBANDRY SUB-SECTION
Iowa Agricultural Experiment Station
Ames, Iowa

(Copy of the letter sent to the heads of the dairy husbandry departments)

Letter No. 3

Dear Sir:

I desire to get more information from men in the leading Dairy States relative to the problem, "The Content of Dairy Husbandry Courses", which I am now studying. Will you please furnish me with names and addresses of persons from your State whom you think would be interested enough to answer a questionnaire?

Could you send me the following names:

1. Fifteen successful dairymen, five of whom are college graduates from the Dairy or Animal Husbandry Departments. If you can not furnish five graduates now engaged in Dairying, make the list up from Dairy or Animal Husbandry graduates who are now engaged in some phase of dairying.
2. Two County Agents who are particularly interested or trained in dairying.
3. Two State Dairy Extension workers or Dairy Specialists.

If you can encourage these men by letter, conference or any other means, to answer and return the questionnaire that will be mailed to them a little later, I would greatly appreciate whatever you may feel inclined to do. A word to them from you would be extremely valuable.

Thanking you for your consideration in this matter, I am

Yours very truly,

L. B. Harmon
Graduate Student

LBH*D

Approved:

C. Y. Cannon,
Chief in Dairy Husbandry

Submission of Questionnaire

There were 29 heads of dairy husbandry departments who sent in a total of 628 names of dairymen, college graduates, county agents, and dairy extension men. Questionnaires accompanied by letters were sent to these people for evaluating. Two to six questionnaires, or a total of 147, were sent to the head of each dairy husbandry department to be evaluated by members of the department staff.

Copies of the letters and questionnaire follow. Also a summary of the returns from the questionnaire is shown in Table III.

DAIRY HUSBANDRY SUB-SECTION
Iowa Agricultural Experiment Station
Ames, Iowa

(Copy of the letter which was sent with the questionnaire to dairymen, county agents, dairy extension men, and college graduates)

Letter No. 4.

Dear Sir:

Your name was given to me through the Dairy Husbandry Department of your State Agricultural College as a person vitally interested in dairying. You possibly received a letter or other information from your college concerning the enclosed questionnaire.

The attached material has been prepared after many months of work in collecting and tabulating courses of study used in many of the colleges of this country. It is presented to you in a form that might be scored with the least amount of time and effort. It really will take but a few minutes of your time to check it over.

May I ask that you look the questionnaire over carefully, score it according to the instructions, then return it to me at your earliest convenience.

Thanking you for your consideration and time in this matter, I am,

Yours very truly

L. B. Harmon
Graduate Student

LBH:CH

Approved:

C. Y. Cannon
Chief in Dairy Husbandry

DAIRY HUSBANDRY SUB-SECTION
Iowa Agricultural Experiment Station
Ames, Iowa

(Copy of the letter which was sent with the questionnaires to the heads of the dairy husbandry departments)

Letter No. 5.

Dear Sir:

Enclosed you will find a few copies of a questionnaire that has been prepared from course outlines collected from the Dairy Husbandry Departments of the various agricultural colleges. The questionnaire is constructed in such a manner that it can be scored by merely making check marks. By this means it is possible to score the paper in a very short time.

Will you be kind enough to score one of these questionnaires according to directions and also ask each member of your department staff to do the same. If you would then return them to me I certainly would appreciate it.

May I express my appreciation to you for the interest and help you have given me in furnishing various kinds of information in order to make this study possible.

Many persons have expressed a desire for a summary of these findings. This will be available to you if you so desire.

Yours very truly

L. B. Harmon
Graduate Student

LBH:CH

Approved:

C. H. Cannon
Chief in Dairy Husbandry

DETERMINING THE VALUE OF ABILITIES AND UNDERSTANDINGS IN DAIRY HUSBANDRY

Name_____
(last name) (first name) (middle name) (or initials)

(Your name will not be used, but I may need to write to you again.)

Address_____

Occupation_____

An attempt is being made to determine what should be taught to college students in Dairy Husbandry by determining the value of abilities and understandings for the general dairy farmer whose major interest is dairying.

Below are abilities and understandings pertaining to Dairy Husbandry. This list was compiled from outlines of Dairy Husbandry Courses that are being taught in various Agricultural Colleges throughout the United States. They represent the abilities and understandings that the colleges are apparently endeavoring to develop in their students. Each major ability or understanding may of course include many minor abilities and understandings.

Score each one separately as A, B, or C. If the ability or understanding is absolutely necessary to success in dairying, place a check mark in column A. If the ability or understanding is important but not absolutely necessary to success in dairying, place a check mark in column B. If the ability or understanding is of minor value for success in dairying, place a check mark in column C.

The following example shows the method of scoring:

Abilities or Understandings	A	B	C
1. An ability to teach a calf to drink	✓		
2. An ability to name the bones in a cow's body . .			✓
3. An understanding of the ancestry of noted animals in the breed that a dairyman is breeding.		✓	

1. An ability to teach a calf to drink may be regarded as absolutely necessary to success in dairying. A check mark would then be placed in column A.

2. An ability to name the bones in a cow's body would possibly be of minor value to success in dairying. A check mark would then be placed in column C.

3. An understanding of the ancestry of noted animals in the breed that a dairyman is breeding may possibly be regarded as <u>important but not absolutely necessary</u> for success in dairying. In this case, a check mark would be placed in column B.

(These scorings are not necessarily correct; they are used merely as illustrations)

In a similar manner, will you please score the following abilities and understandings from the standpoint of their value <u>to the general dairy farmer whose major interest is dairying</u>.

The number in parenthesis (28)(76) etc. are key numbers and refer to another list for checking purposes only.

Abilities or Understandings

	A	B	C
1.(28) An ability to manage calves from birth until six months of age			
2. (76) An ability to feed the dry cow			
3.(50) An ability to care for and manage dairy bulls.			
4.(72) An ability to prepare feed for dairy animals by grinding, chopping, soaking, etc. that will give the best results in feeding			
5.(128) An ability to judge or select dairy cattle by type			
6.(143) An ability to remodel dairy buildings in order to increase their efficiency.			
7.(151) An ability to maintain proper sanitary conditions around the dairy farm			
8.(154) An ability to successfully treat an animal for milk fever.			
9.(1) An understanding of the history and development of dairying			
10.(89) An ability to understand the factors that influence color of milk.			
11.(148) An ability to construct or supervise the construction of a satisfactory milk house.			
12.(48) An ability to manage kicking and self sucking cows			
13.(4) An ability to compare dairying in the United States with that in other countries.			
14.(52) An understanding of the biological structure and functions of male and female animals			
15.(66) An understanding of the chemical composition of plants and animals and their uses and relation to feeding practices			
16.(107) An ability to determine the cost of producing milk based upon feed, labor, buildings, depreciation, replacements, etc.			
17.(132) An ability to fit animals for show in a proper manner.			
18.(158) An understanding of the values of 2, 3, or 4 times a day milkings			
19.(2) An ability to determine the opportunities of dairying			
20.(80) An understanding of the principles of various feeding standards.			
21.(133) An ability to recall the names of some of the more important show ring champion animals.			
22.(65) An understanding of the history and development of animal nutrition and practices in milk production			
23.(122) An ability to take care of business correspondence in an efficient manner.			
24.(3) An understanding of the place of dairying in a permanent system of agriculture.			

	A	B	C
25.(22) An understanding of the importance of selecting purebred sires	...	...	...
26.(90) An ability to standardize milk	...	...	...
27.(155) An understanding of the diseases that may be transmitted from animals to man or from man to animals.	...	...	...
28.(30) An ability to feed proper amounts of mineral matter to calves	...	...	...
29.(91) An ability to produce certified milk	...	...	...
30.(150) An understanding of the nature of the minor diseases or ailments of dairy cattle and an ability to give first aid treatment.	...	...	...
31.(15) An ability to adjust farm conditions to meet the needs for the kind of dairy business in which a person is engaged.	...	...	...
32.(51) An ability to provide proper equipment for handling the bull.	...	...	...
33.(69) An understanding of the process of digestion as a background for estimating the feed requirements of dairy animals	...	...	...
34.(115) An ability to fill out papers for transfering ownership of pure bred animals	...	...	...
35.(124) An understanding of the National, State, and Local Funds that are available for use in promoting dairying	...	...	...
36.(24) An ability to raise dairy calves successfully that are permitted to suck the cow and receive other supplementary feeds.	...	...	...
37.(56) An ability to inbreed advantageously	...	...	...
38.(111) An ability to determine the amount of labor at various seasons or times of the year that is necessary to economically operate the dairy farm	...	...	...
39.(117) An understanding of the organization and values of Cow Testing Associations.	...	...	...
40.(34) An ability to use milking machines most advantageously	...	...	...
41.(47) An ability to determine when a cow is with calf	...	...	...
42.(113) An understanding of the advanced registry tests and methods of making them for the various breeds	...	...	...
43.(106) An ability to take an inventory of the dairy farm	...	...	...
44.(137) An ability to properly show animals in the show ring.	...	...	...
45.(35) An ability to milk and manage hard milkers	...	...	...
46.(57) An understanding of the family system of breeding, and an ability to line breed successfully.	...	...	...
47.(63) An ability to control, with a fair degree of success, the factors that influence milk production.	...	...	...

	A	B	C
48.(82) An understanding of the anatomy, functions, and structure of the udder	...	...	....
49.(102) An ability to clean and care for utensils used in handling milk.	...	...	....
50.(112) An understanding of the economic principles in relation to dairying.	...	...	....
51.(123) An ability to crate and ship animals properly	...	...	....
52.(127) An understanding of dairy legislation and laws	...	...	....
53.(129) An ability to conduct a judging contest of dairy cattle	...	...	....
54.(156) An ability to control flies that annoy cattle	...	...	....
55.(159) An understanding of the results to be expected when animals are fed all they will possibly eat. . .	...	...	....
56.(7) An understanding of the history and development of the major breeds of Dairy Cattle	...	...	....
57.(16) An ability to determine the best method of starting or increasing a dairy herd.	...	...	....
58.(19) An ability to select dairy animals by their pedigree	...	...	....
59.(25) An ability to raise calves that are fed by hand, using the kind of feeds that are available, such as, whole milk, milk substitutes, calf meals, grain, etc..	...	...	....
60.(31) An ability to determine whether young animals are making proper growth	...	...	....
61.(44) An understanding of the proper time to breed dairy heifers and cows	...	...	....
62.(49) An ability to supply water to the dairy herd in a manner that is most advantageous to the animals throughout the year.	...	...	....
63.(53) An understanding of the stages of foetal development from the time of fertilization until birth.	...	...	....
64.(64) An understanding of the relation of body conformation, records of ancestry, breeding, etc. that serve as a means of predicting milk yield.	...	...	....
65.(92) An understanding of the kinds of milk products and their importance to dairying.	...	...	....
66.(104) An ability to use and care for milk separators	...	...	....
67.(114) An ability to fill out registration papers for registering pure bred animals.	...	...	....
68.(120) An ability to advertise the dairy and its products	...	...	....
69.(109) An ability to determine costs of one's own dairy and make cost comparisons with other farms . .	...	...	....
70.(130) An ability to name some of the leading show ring judges.	...	...	....
71.(110) An ability to determine the amount of feed that will be required for a year's time.	...	...	....
72.(135) An understanding of the names, location, and breeding of animals kept on some of the outstanding farms in local state and in the United States. . . .	...	...	....

	A	B	C
73.(142) An understanding of the adaptability of farm buildings to dairying.	...	...	...
74.(152) An ability to successfully manage contagious abortion	...	...	...
75.(149) An ability to construct or supervise the construction of a suitable cooling tank.	...	...	...
76.(147) An understanding of diseases and ailments that particularly attack calves and to know their methods of treatment	...	...	...
77.(8) An understanding of the characteristics of the major breeds of dairy cattle	...	...	...
78.(17) An ability to cooperate with others in promoting individual and community interests in dairying	...	...	...
79.(32) An ability to feed and manage dairy heifers from six months of age until freshening.	...	...	...
80.(29) An ability to raise veal calves.	...	...	...
81.(36) An ability to mark and tattoo animals.	...	...	...
82.(42) An understanding of the values of dehorning dairy animals.	...	...	...
83.(45) An ability to manage and care for a cow properly before, during, and after calving	...	...	...
84.(54) An understanding of how inheritance occurs so that the breeder can interpret what has and might take place	...	...	...
85.(55) An ability to rate the breeding worth of a bull from the performance of his ancestors, from his own individuality, and from the performance of his progeny.(bull index).	...	...	...
86.(62) An understanding of the values and effects of cross breeding.	...	...	...
87.(70) An ability to define the various terms used in dairy husbandry	...	...	...
88.(73) An ability to apply practical rules for feeding.	...	...	...
89.(87) An understanding of the factors affecting the composition of milk.	...	...	...
90.(97) An ability to pasteurize milk.	...	...	...
91.(116) An understanding of the Dairy Herd Improvement Work and its value.	...	...	...
92.(125) An ability to develop an interest for dairying among the people.	...	...	...
93.(134) An ability to name some of the outstanding breeders and exhibitors of show ring animals	...	...	...
94.(144) An understanding of the advantages of different types of internal arrangement of dairy barns.	...	...	...
95.(153) An ability to establish a herd free from tuberculosis	...	...	...
96.(160) An understanding of the proper food and amount of mineral to feed a cow.	...	...	...

	A	B	C
97.(9) An understanding of the importations of dairy animals to the United States and their influences upon the breeds.	...	...	...
98.(14) An understanding of the value and characteristics of goats as producers of milk	...	...	...
99.(18) An ability to select a breed appropriate for a given condition.	...	...	...
100.(21) An ability to select dairy animals from their production records.	...	...	...
101.(33) An ability to feed and manage the milking herd	...	...	...
102.(37) An ability to groom, clip, and trim the hoofs and horns of dairy animals.	...	...	...
103.(41) An ability to dehorn animals by the use of a saw or slippers	...	...	...
104.(61) An understanding of the history and development of breeding operations.	...	...	...
105.(71) An ability to determine the volume in cubic feet per ton of different feeds and determine their costs	...	...	...
106.(74) An understanding of the merits of different kinds of feeds.	...	...	...
107.(75) An ability to feed and manage cows on test in order to make the best possible record	...	...	...
108.(84) An understanding of the theories of milk secretion	...	...	...
109.(88) An understanding of the food values of milk. .	...	...	...
110.(81) An ability to handle manure properly	...	...	...
111.(78) An ability to provide desirable pasture for dairy animals	...	...	...
112.(93) An understanding of the methods of manufacturing and handling of dairy products	...	...	...
113.(95) An ability to handle and prepare market milk and cream	...	...	...
114.(98) An ability to use the Babcock Tester in testing milk and its products for butter fat.	...	...	...
115.(94) An ability to grade milk and its products. . .	...	...	...
116.(118) An understanding of the Herd Classification and Sire Recognition work of the Holstein Breed . . .	...	...	...
117.(121) An ability to buy and sell animals and dairy products to the best advantage.	...	...	...
118.(119) An ability to make and interpret pedigrees . .	...	...	...
119.(126) An ability to organize calf clubs.	...	...	...
120.(131) An understanding of the history and development of the show ring	...	...	...
121.(136) An ability to classify animals properly for the show ring	...	...	...
122.(145) An understanding of the values of different kinds of equipment for dairy barns.	...	...	...
123.(147) An ability to select and have constructed the proper kind of silo to meet the needs of the farm . .	...	...	...

	A	B	C
124.(10) An understanding of the influential animals and breeders and their contributions in the development of the breeds			
125.(39) An ability to dehorn animals by the use of caustic potash.			
126.(38) An ability to photograph animals			
127.(46) An understanding of the importance of gentleness in handling dairy animals.			
128.(58) An understanding of the organization, purpose, and relation of breed associations to breed improvement.			
129.(77) An ability to feed the bull.			
130.(79) An ability to determine desirable commercial feeds			
131.(85) An understanding of the nervous control of milk secretion.			
132.(96) An ability to sell and distribute milk and its products.			
133.(99) An ability to calculate fat yields from results of tests.			
134.(139) An understanding of the relationship between type and production			
135.(141) An understanding of the kinds and construction of dairy buildings.			
136.(146) An understanding of proper ventilating and lighting systems for barns and other dairy buildings.			
137.(11) An understanding of the distribution of dairy animals throughout the world and the United States.			
138.(86) An understanding of the effect of hormones on milk secretion			
139.(59) An understanding of the relative importance of sire and dam in transmitting dairy qualities			
140.(101) An ability to satisfactorily control bacteria in milk			
141.(103) An ability to cool milk properly			
142.(12) An understanding of the history and development of the minor breeds of dairy cattle.			
143.(45) An ability to train the horns of a dairy animal.			
144.(60) An ability to establish a reputation as a reliable breeder.			
145.(13) An understanding of the characteristics of the minor breeds of dairy cattle.			
146.(100) An ability to make other tests with milk besides butter-fat tests.			
147.(68) An ability to compute rations and determine costs for dairy animals			

If there are other important abilities and understandings that should be included, that are not given above, will you please make a note of the ones you think should be added.

Table III. Total questionnaires sent out, the number, and percent returned.

States	Dairy-men	Heads of D.H. Depts.	Assoc. Profs.	Co. Agts.	Ext. men	Col. Grads.	Herds-men	Total No. rec'd	Total No. sent out	Percent returned
	Number of questionnaires received									
Arizona		1	1					2	2	100
Arkansas	5	1		1	1	2		10	21	48
California	5	1		1	1		2	10	18	55
Colorado	9			1	1	1		12	22	54
Connecticut	9	1	1	2	2			15	23	65
Delaware		1	1					2	2	100
Georgia	3	1	1	1			1	7	21	33
Idaho	5	1		3	1		1	11	22	50
Illinois	9			2	1		1	13	24	54
Indiana	11			1			1	13	42	31
Iowa	16	1	2	1	3	6	6	35	47	74
Kansas	8	1	2		2			13	24	54
Kentucky	5			1	2		2	10	23	43
Louisiana	2	1		1	2		1	7	22	32
Maine		1	1					2	2	100
Maryland	4	2	1		1		3	11	23	48
Massachusetts		1						1	3	33
Michigan	10	2	3	1	3		7	26	37	70
Minnesota	4	1	2	2	1	1	1	12	16	75
Mississippi		1						1	2	50
Missouri	10	1	1				2	14	31	45
Montana	1	1	1	2				5	15	33
Nebraska	8	1		2	2	1		14	28	50
Nevada				1				1	2	50
New Hampshire		1						1	2	50
New Jersey						1		1	3	33
New Mexico		1	1		1			3	3	100
New York			6					6	13	46
North Carolina		1	1					2	3	66
North Dakota	8	1					1	10	22	45
Ohio	9	1	2	1	2		3	18	25	72
Oklahoma	7	1			2			10	22	45
Oregon	7	1	1	1				10	23	43
Pennsylvania	16	1	3	6	3		2	31	53	58
Rhode Island	1	1						2	2	100
South Carolina		1	3					4	4	100
South Dakota	7	1	1	2	2		2	15	20	75

[illegible]	9			2	1		1	15	24	54
Indiana	11			1			1	13	42	31
Iowa	16	1	2	1	3	6	6	35	47	74
Kansas	8	1	2		2			13	24	54
Kentucky	5			1	2		2	10	23	43
Louisiana	2	1		1	2		1	7	22	32
Maine		1	1					2	2	100
Maryland	4	2	1		1		3	11	23	48
Massachusetts		1						1	3	33
Michigan	10	2	3	1	3		7	26	37	70
Minnesota	4	1	2	2	1	1	1	12	16	75
Mississippi		1						1	2	50
Missouri	10	1	1				2	14	31	45
Montana	1	1	1	2				5	15	33
Nebraska	8	1		2	2	1		14	28	50
Nevada				1				1	2	50
New Hampshire		1						1	2	50
New Jersey						1		1	3	33
New Mexico		1	1		1			3	3	100
New York			6					6	13	46
North Carolina		1	1					2	3	66
North Dakota	8	1					1	10	22	45
Ohio	9	1	2	1	2		3	18	25	72
Oklahoma	7	1			2			10	22	45
Oregon	7	1	1	1				10	23	43
Pennsylvania	16	1	3	6	3		2	31	53	58
Rhode Island	1	1						2	2	100
South Carolina		1	3					4	4	100
South Dakota	7	1	1	2	2		2	15	20	75
Tennessee	1			1	2			4	13	31
Texas	8	1		1	1		2	13	21	62
Utah	7	1		2		1		11	16	69
Virginia	6	1	1	2	2		1	13	23	56
Vermont	7	1	1	4	1		1	15	26	58
Washington					1		1	2	3	66
Wisconsin						1		1	4	25
Wyoming		1						1	2	50
Total	208	37	37	43	40	14	41	420	775	54

Table III shows that 45 states are represented in the returns of the questionnaires. The number of questionnaires which were returned ranged from 1 to 35 with an average of 12 from each of the forty-five states.

Six states returned all of the questionnaires which were sent to them, but they all came from dairy husbandry instructors and extension men.

The small number of returns from college graduates might be accounted for by the fact that after they graduated from college, they became engaged in other work than dairy farming. Their questionnaires were then recorded, according to their occupation. Some of them were included with the herdsmen, others with the county agents, etc.

Groups of People evaluating the Questionnaire

There was a total of 420 people from locations throughout the United States who rated the abilities and understandings in the questionnaire. Their ratings were combined into groups, according to their occupation. This grouping was made in order to place people of the same general type together. This was done so that the total scores for each group could be used as a unit, rather than using their individual scores. The different groups of people that were considered, and the number of individuals in each group is given in Table IV.

Table IV. Occupation and number of persons in each occupational group.

Occupational Group	No. of Persons
Dairymen	208
Heads of Dairy Husbandry Departments	37
Associate and other Professors	37
County Agents	43
Extension men	40
College Graduates in Dairy Husbandry	14
Herdsmen	41
Total	420

Recording and Arranging the Scores from the Questionnaire

The recording of the scores placed on questionnaires was made by tabulating the number of "A", "B", or "C" scores given to each ability or understanding. The questionnaires which were received from each group of people were placed together and their scores recorded as a group.

In some instances, the score for a particular ability or understanding was recorded as zero instead of "A", "B", or "C". A zero score was recorded when scores were omitted or when the score intended to be given by the person scoring the questionnaire could not be determined.

Final Rank of Abilities and Understandings Listed in Descending Order

The abilities and understandings were listed in order of their descending scores. The result was that "The ability to feed the milking herd" was at the head of the list. The others follow in order of rank in Table V.

Table V. Abilities and Understandings listed in descending order of their final scoring by 420 persons.

The second number in parenthesis refers to the number of the ability or understanding as it appears in the questionnaire. The ranking of the abilities is made from the final scores.

An illustration will show how the final numerical placing of the abilities is made.

Question No. 22 in the following list was scored by 417 persons. It was not scored by three people.

SCORES	NUMBER	MULTIPLIED BY			
A	337	3	=	1011	
B	75	2	=	150	$\frac{1166}{417} = 2.796$
C	5	1	=	5	
Not scored	3				
	420			1166	

All other questions were treated in the same manner, then listed in order from highest to lowest scores. They are listed as follows:

	Score
1.(101) An ability to feed and manage the milking herd.	2.966
2.(1) An ability to manage calves from birth until six months of age	2.952
3.(25) An understanding of the importance of selecting purebred sires.	2.947
4.(83) An ability to manage and care for a cow properly before, during, and after calving. . . .	2.937
5.(59) An ability to raise calves that are fed by hand, using the kinds of feeds that are available such as whole milk, milk substitutes, calf meals, grain, etc.	2.914
6.(88) An ability to apply practical rules for feeding	2.092
7.(79) An ability to feed and manage dairy heifers from six months of age until freshening	2.876
8.(74) An ability to successfully manage contagious abortion.	2.870
9.(49) An ability to clean and care for utensils used in handling milk	2.869
10.(140) An ability to satisfactorily control bacteria in milk	2.852

11.(31) An ability to adjust farm conditions to meet the needs for the kind of dairy business in which a person is engaged 2.850
12.(147) An ability to compute rations and determine costs for dairy animals. 2.837
13.(106) An understanding of the merits of different kinds of feeds 2.828
14.(141) An ability to cool milk properly. 2.824
15.(61) An understanding of the proper time to breed dairy heifers and cows 2.816
16.(111) An ability to provide desirable pasture for dairy animals. 2.815
17.(95) An ability to establish a herd free from tuberculosis 2.811
18.(117) An ability to buy and sell animals and dairy products to the best advantage 2.809
19.(100) An ability to select dairy animals from their production records 2.807
20.(47) An ability to control, with a fair degree of success, the factors that influence milk production 2.800
21.(2) An ability to feed the dry cow. 2.799
22.(7) An ability to maintain proper sanitary conditions around the dairy farm 2.796
23.(3) An ability to care for and manage dairy bulls. 2.792
24.(57) An ability to determine the best method of starting or increasing a dairy herd. 2.791
25.(30) An understanding of the nature of the minor diseases or ailments of dairy cattle and an ability to give first aid treatment. 2.790
26.(62) An ability to supply water to the dairy herd in a manner that is most advantageous to the animals throughout the year. 2.783
27.(76) An understanding of diseases and ailments that particularly attack calves and to know their methods of treatment 2.777
28.(96) An understanding of the proper food and amount of mineral to feed a cow. 2.770
29.(16) An ability to determine the cost of producing milk based upon feed, labor, buildings, depreciation, replacements, etc. 2.740
30.(85) An ability to rate the breeding worth of a bull from the performance of his ancestors, from his own individuality, and from the performance of his progeny.(bull index). 2.732
31.(127) An understanding of the importance of gentleness in handling of a dairy animal 2.725
32.(129) An ability to feed the bull 2.710
33.(144) An ability to establish a reputation as a reliable breeder 2.704
34.(71) An ability to determine the amount of feed that will be required for a year's time. 2.650

35.(69) An ability to determine costs of one's own dairy and make cost comparisons with other farms 2.466
36.(113) An ability to handle and prepare market milk and cream 2.637
37.(139) An understanding of the relative importance of sire and dam in transmitting dairy qualities. 2.621
38.(38) An ability to determine the amount of labor at various seasons or times of the year that is necessary to economically operate the dairy farm 2.620
39.(99) An ability to select a breed appropriate for a given condition. 2.619
40.(60) An ability to determine whether young animals are making proper growth 2.601
41.(55) An understanding of the results to be expected when animals are fed all they will possibly eat 2.595
42.(23) An ability to take care of business correspondence in an efficient manner. 2.588
43.(39) An understanding of the organization and values of Cow Testing Associations 2.585
44.(4) An ability to prepare feed for dairy animals by grinding, chopping, soaking, etc. that will give the best results in feeding. 2.561
45.(43) An ability to take an inventory of the dairy farm 2.558
46.(133) An ability to calculate fat yields from results of tests 2.529
47.(32) An ability to provide proper equipment for handling the bull. 2.526
48.(91) An understanding of the Dairy Herd Improvement Work and its value. 2.523
49.(130) An ability to determine desirable commercial feeds 2.520
50.(134) An understanding of the relationship between type and production. 2.507
51.(136) An understanding of proper ventilating and lighting systems for barns and other dairy buildings. 2.491
52.(110) An ability to handle manure properly. . . . 2.484
53.(132) An ability to sell and distribute milk and its products 2.464
54.(84) An understanding of how inheritance occurs so that the breeder can interpret what has and might take place 2.462
55.(66) An ability to use and care for milk separators 2.447
56.(73) An understanding of the adaptability of farm buildings to dairying 2.447
57.(78) An ability to cooperate with others in promoting individual and community interests in dairying 2.440

58.(123) An ability to select and have constructed the proper kind of silo to meet the needs of the farm 2.434
59.(19) An ability to determine the opportunities of dairying. 2.409
60.(5) An ability to judge or select dairy cattle by type 2.390
61.(68) An ability to advertise the dairy and its products 2.388
62.(24) An understanding of the place of dairying in a permanent system of agriculture 2.379
63.(64) An understanding of the relation of body conformation, records of ancestry, breeding, etc. that will serve as a means of predicting milk yield 2.378
64.(109) An understanding of the food values of milk 2.368
65.(58) An ability to select dairy animals by their pedigree 2.338
66.(75) An ability to construct or supervise the construction of a suitable cooling tank. 2.333
67.(54) An ability to control flies that annoy cattle 2.313
68.(50) An understanding of the economic principles in relation to dairying. 2.313
69.(27) An understanding of the diseases that may be transmitted from animals to man or from man to animals 2.310
70.(107) An ability to feed and manage cows on test in order to make the best possible record. . . . 2.307
71.(8) An ability to successfully treat an animal for milk fever 2.301
72.(40) An ability to use milking machines most advantageously 2.288
73.(122) An understanding of the values of different kinds of equipment for dairy barns 2.279
74.(46) An understanding of the family system of breeding, and an ability to line breed successfully. 2.264
75.(67) An ability to fill out registration papers for registering pure bred animals. 2.258
76.(34) An ability to fill out papers for transferring ownership of pure bred animals. 2.256
77.(135) An understanding of the kinds and construction of dairy buildings. 2.253
78.(118) An ability to make and interpret pedigrees. 2.244
79.(20) An understanding of the principles of various feeding standards. 2.239
80.(41) An ability to determine when a cow is with calf 2.235
81.(86) An understanding of the values and effects of cross breeding. 2.232

82.(114) An ability to use the Babcock Tester in testing milk and its products for butter fat 2.229
83.(18) An understanding of the values of 2, 3, or 4 times a day milkings 2.220
84.(28) An ability to feed proper amounts of mineral matter to calves 2.209
85.(94) An understanding of the advantages of different types of internal arrangement in dairy barns. 2.139
86.(6) An ability to remodel dairy buildings in order to increase their efficiency 2.156
87.(33) An understanding of the values and effects of cross breeding. 2.150
88.(131) An understanding of the nervous control of milk secretion.. . . . . 2.134
89.(77) An understanding of the characteristics of the major breeds of dairy cattle 2.095
90.(128) An understanding of the organization, purpose, and relation of breed associations to breed improvement. 2.050
91.(45) An ability to milk and manage hard milkers. 2.046
92.(11) An ability to construct or supervise the construction of a satisfactory milk house. . . . 2.043
93.(125) An ability to dehorn animals by the use of caustic potash. 2.041
94.(48) An understanding of the anatomy, functions, and structure of the udder 2.038
95.(15) An understanding of the chemical composition of plants and animals and their uses and relation to feeding practices.. . . . . 2.034
96.(36) An ability to raise dairy calves successfully that are permitted to suck the cow and receive other supplementary feeds. 2.031
97.(65) An understanding of the kinds of milk products and their importance to dairying. . . . 2.028
98.(105) An ability to determine the volume in cubic feet per ton of different feeds and determine their costs. 2.028
99.(89) An understanding of the factors affecting the composition of milk. 2.007
100.(87) An ability to define the various terms used in Dairy Husbandry 1.971
101.(112) An understanding of the methods of manufacturing and handling of dairy products 1.971
102.(102) An ability to groom, clip, and trim the hoofs and horns of dairy animals 1.964
103.(82) An understanding of the values of dehorning dairy animals. 1.962
104.(92) An ability to develop an interest for dairying among the people. 1.918

105.(12) An ability to manage kicking and self sucking cows. 1.918
106.(37) An ability to inbreed advantageously . . . 1.907
107.(103) An ability to dehorn animals by the use of a saw or clippers. 1.870
108.(42) An understanding of the advanced registry tests and methods of making them for the various breeds. 1.869
109.(52) An understanding of Dairy Legislation and laws. 1.854
110.(115) An ability to grade milk and its products. 1.846
111.(81) An ability to mark and tattoo animals. . . 1.840
112.(22) An understanding of the history and development of animal nutrition and practices in milk production 1.839
113.(14) An understanding of the biological structure and functions of male and female animals 1.814
114.(108) An understanding of the theories of milk secretion 1.803
115.(26) An ability to standardize milk 1.786
116.(29) An ability to produce certified milk . . . 1.780
117.(104) An understanding of the history and development of breeding operations 1.778
118.(51) An ability to crate and ship animals properly. 1.760
119.(124) An understanding of the influential animals and breeders and their contributions in the development of the breeds 1.720
120.(80) An ability to raise veal calves. 1.686
121.(17) An ability to fit animals for show in a proper manner 1.676
122.(116) An understanding of the Herd Classification and Sire Recognition work of the Holstein Breed 1.633
123.(63) An understanding of the stages of foetal development from the time of fertilization until birth 1.627
124.(44) An ability to properly show animals in the show ring 1.619
125.(72) An understanding of the names, location, and breeding of animals kept on some of the outstanding farms in local state and in the United States 1.618
126.(56) An understanding of the history and development of the major breeds of dairy cattle 1.588
127.(121) An ability to classify animals properly for the show ring 1.573
128.(90) An ability to pasteurize milk. 1.571
129.(126) An ability to photograph animals 1.563

130.(35) An understanding of the national, state, and local funds that are available for use in promoting dairying 1.541
131.(138) An understanding of the effect of hormones on milk secretion 1.539
132.(146) An ability to make other tests with milk besides butter fat tests. 1.532
133.(119) An ability to organize calf clubs. 1.520
134.(97) An understanding of the importations of dairy animals to the United States and their influences upon the breeds. 1.463
135.(53) An ability to conduct a judging contest of dairy cattle. 1.422
136.(137) An understanding of the distribution of dairy animals throughout the world and the United States 1.410
137.(10) An ability to understand the factors that influence color of milk 1.402
138.(9) An understanding of the history and development of dairying 1.378
139.(93) An ability to name some of the outstanding breeders and exhibitors of show ring animals. . 1.371
140.(143) An ability to train the horns of a dairy animal. 1.344
141.(21) An ability to recall the names of some of the more important show ring champion animals . 1.325
142.(145) An understanding of the characteristics of the minor breeds of dairy cattle. 1.313
143.(70) An ability to name some of the leading show ring judges. 1.265
144.(13) An ability to compare dairying in the United States with that in other countries. . . 1.264
145.(120) An understanding of the history and development of the show ring. 1.260
146.(142) An understanding of the history and development of the minor breeds of dairy cattle. . . 1.218
147.(98) An understanding of the value and characteristics of goats as producers of milk 1.192

The abilities and understandings listed in order of their importance show significant trends in the number of "A", "B", and "C" scores. The distribution of scores and the final average score are given in Table VI.

Table VI. Scoring and rank of the abilities and understandings.

Numerical order	Questionnaire number	Total number of final scores from the 420 replies				Rank	Numerical order	Questionnaire number	Total number of final scores from the 420 replies				Total Average Score
		Zero	A's	B's	C's				Zero	A's	B's	C's	
1	101	2	404	14	0	2.966	75	67	2	180	166	72	2.258
2	1	0	400	20	0	2.952	76	34	2	179	167	72	2.256
3	25	1	397	22	0	2.947	77	135	1	145	235	39	2.253
4	83	1	395	22	2	2.937	78	118	2	161	198	59	2.244
5	59	0	385	34	1	2.914	79	20	1	166	187	66	2.239
6	88	0	384	31	5	2.902	80	41	3	169	177	71	2.235
7	79	0	371	46	3	2.876	81	86	2	155	205	58	2.232
8	74	4	365	48	3	2.870	82	114	0	172	172	76	2.229
9	49	1	369	45	5	2.869	83	18	1	150	211	58	2.220
10	140	2	360	54	4	2.852	84	28	3	157	190	70	2.209
11	51	1	361	53	5	2.850	85	94	0	129	233	58	2.169
12	147	3	355	56	6	2.837	86	6	4	117	247	52	2.156
13	106	1	347	72	0	2.828	87	33	1	142	198	79	2.150
14	141	0	352	62	6	2.824	88	131	2	151	172	95	2.134
15	61	1	345	71	3	2.816	89	77	1	117	225	77	2.095
16	111	2	346	67	5	2.815	90	128	1	111	218	90	2.050
17	95	1	355	49	15	2.811	91	45	5	135	164	116	2.046
18	117	5	346	59	10	2.809	92	11	2	116	204	98	2.043
19	100	1	344	69	6	2.807	93	125	2	133	169	116	2.041
20	47	5	343	61	11	2.800	94	48	0	111	214	95	2.038
21	2	1	336	82	1	2.799	95	15	3	115	201	101	2.034
22	7	3	337	75	5	2.796	96	36	7	144	138	131	2.031
23	3	6	334	74	6	2.792	97	65	3	100	229	88	2.028
24	57	3	335	77	5	2.791	98	105	2	122	186	110	2.028
25	30	1	334	82	3	2.790	99	89	1	100	222	97	2.007
26	62	0	337	75	8	2.783	100	87	0	100	208	112	1.971
27	76	2	329	85	4	2.777	101	112	1	90	227	102	1.971
28	96	2	331	78	9	2.770	102	102	1	96	212	111	1.964
29	16	0	329	83	8	2.740	103	82	1	111	181	127	1.962
30	85	2	317	90	11	2.732	104	92	5	93	195	127	1.918
31	127	1	321	81	17	2.725	105	12	5	109	163	143	1.918
32	129	2	314	87	17	2.710	106	37	9	100	173	133	1.907
33	144	5	317	73	25	2.704	107	103	4	84	194	138	1.870
34	71	0	289	115	16	2.650	108	42	1	74	216	129	1.869
35	69	2	284	119	15	2.643	109	52	2	76	205	137	1.854
36	113	4	283	115	18	2.637	110	115	4	85	182	149	1.846
37	139	3	278	120	19	2.621	111	81	2	100	151	167	1.840
38	38	1	283	113	23	2.620	112	22	4	76	197	143	1.839

29	16	0	329	83	8	2.740
30	85	2	317	90	11	2.732
31	127	1	321	81	17	2.725
32	129	2	314	87	17	2.710
33	144	5	317	73	25	2.704
34	71	0	289	115	16	2.650
35	69	2	284	119	15	2.643
36	113	4	283	115	18	2.637
37	139	3	278	120	19	2.621
38	38	1	283	113	23	2.620
39	99	2	280	117	21	2.619
40	60	1	266	137	14	2.601
41	55	3	271	123	23	2.595
42	23	2	259	146	13	2.588
43	39	1	257	150	12	2.585
44	4	1	268	118	33	2.561
45	43	1	265	123	31	2.558
46	133	2	254	131	33	2.529
47	32	2	245	148	25	2.526
48	91	1	236	166	17	2.523
49	130	1	251	135	33	2.520
50	134	2	245	140	33	2.507
51	136	1	225	175	19	2.491
52	110	7	234	145	34	2.484
53	132	2	226	160	32	2.464
54	84	2	226	159	33	2.462
55	66	2	226	153	39	2.447
56	73	2	207	191	20	2.447
57	78	0	215	175	30	2.440
58	123	1	223	155	41	2.434
59	19	2	223	143	52	2.409
60	5	2	186	209	23	2.390
61	68	2	202	176	40	2.388
62	24	3	198	179	40	2.379
63	64	2	206	164	48	2.378
64	109	4	208	153	55	2.368
65	58	3	181	196	40	2.338
66	75	2	189	179	50	2.333
67	54	1	185	180	54	2.313
68	50	2	183	183	52	2.313
69	27	4	184	177	55	2.310
70	107	0	184	181	55	2.307
71	8	1	179	187	53	2.301
72	40	4	172	192	52	2.288
73	122	1	156	224	39	2.279
74	46	4	171	184	61	2.264
102	102	1	96	212	111	1.964
103	82	1	111	181	127	1.962
104	92	5	93	195	127	1.918
105	12	5	109	163	143	1.918
106	37	9	100	173	133	1.907
107	103	4	84	194	138	1.870
108	42	1	74	216	129	1.869
109	52	2	76	205	137	1.854
110	115	4	85	182	149	1.846
111	81	2	100	151	167	1.840
112	22	4	76	197	143	1.839
113	14	0	80	182	158	1.814
114	108	3	75	189	153	1.813
115	26	4	77	173	166	1.786
116	29	6	72	179	163	1.780
117	104	5	67	189	159	1.778
118	51	3	68	191	158	1.760
119	124	2	52	197	169	1.720
120	80	3	68	150	199	1.686
121	17	0	40	204	176	1.676
122	116	9	43	174	194	1.633
123	63	2	42	178	198	1.627
124	44	5	37	183	195	1.619
125	72	1	39	181	199	1.618
126	56	0	31	185	204	1.588
127	121	3	46	147	224	1.573
128	90	5	44	149	222	1.571
129	126	5	42	150	223	1.563
130	35	2	30	166	222	1.541
131	138	14	42	135	229	1.539
132	146	3	31	160	226	1.532
133	119	5	36	144	235	1.520
134	97	1	23	148	248	1.463
135	53	3	26	124	267	1.422
136	137	1	17	138	264	1.410
137	10	3	22	124	271	1.402
138	9	2	16	126	276	1.378
139	93	0	20	116	284	1.371
140	143	4	20	103	293	1.344
141	21	1	16	104	299	1.325
142	145	2	17	97	304	1.313
143	70	1	16	79	324	1.265
144	13	0	13	85	322	1.264
145	120	2	14	81	323	1.260
146	142	2	8	75	335	1.218
147	98	4	14	52	350	1.192

A striking thing about Table VI is the distribution of the "A", "B", and "C" scores. The "A" scores are greatest for the abilities and understandings which rank highest. A gradual decrease in the number of "A" scores is observed as the abilities and understandings decrease in value. Beginning at the top of the table, and observing the "B" scores in descending numerical order, it is observed that they begin with a relatively small number and gradually increase until a little past the center, then gradually decrease until the last ability is reached. There are no "C" scores in the first three abilities, but from here on, they gradually increase in number. Attention is called to number 131 which had 14 zero scores. This question was titled "An understanding of the effect of hormones on milk secretion." Out of the 14 zero scores, eleven of them were by dairymen. This might be explained by the fact that many dairymen did not understand the question and failed to score it. There were more zero scores at the lower end of the list than the upper end.

Determining the Reliability of the Scores given to the Abilities and Understandings

If the distribution of scores given to the abilities and understandings had been made at random, there would be approximately the same number of "A", "B", and "C" scores. Table VI shows that this was not the case because some which rated as the most important abilities and understandings had

more "A" scores and fewer "B" and "C" scores. By determining the percent of "A", "B", and "C" scores for the individual abilities and understandings, the proportionate number of scores given by each group of people can be compared. The percentage distribution of the scores for certain individual abilities and understandings is given in tables VII, VIII, IX, X, and XI. Table VII shows the number and percent of scores for "The ability to feed the milking herd." This ability ranked first in importance among the 147 abilities and understandings. The table shows that all groups gave 92.5 to 100 percent "A" scores, with an average percentage of 96.2. The "B" scores vary from no scores at all to 7.1 percent with an average for the group of 3.3 percent. No "C" scores were given to this ability by any of the groups. These data show a consistency in the percentage of "A", "B", and "C" scores given by all the groups for this ability, which is evidence of the reliability of the scoring by the different groups of people. The tables for the five individual abilities, showing the number and percent of scores follow.

Table VII. Number and percent of scores for the ability to feed the milking herd. (1)

Scores	Dairy-men	Heads of D.H. Depts.	Assoc. Profs.	County Agents	Exten. men	College Grads.	Herds-men	Total	Total Average Score
Zero					1 2.5		1 2.4	2 .5	
A	201* 96.6**	37 100	36 97.3	41 95.3	37 92.5	13 92.9	39 95.1	404 96.2	
B	7 3.4		1 2.7	2 4.7	2 .5	1 7.1	1 2.4	14 3.3	
C									
Total	208 100	37 100	37 100	45 100	40 100	14 100	41 100	420 100	2.966

*Number of scores given by the group
**Percent of total scores for the group

Table VIII. Number and percent of scores for the ability to select purebred sires. (3)

Scores	Dairy-men	Heads of D.H. Depts.	Assoc. Profs.	County Agents	Exten. men	College Grads.	Herds-men	Total	Total Average Score
Zero							1 2.4	1 .2	
A	200* 96.2**	35 94.6	35 94.6	39 90.7	39 97.5	13 92.9	36 87.8	397 94.5	
B	8 3.8	2 5.4	2 5.4	4 9.3	1 2.5	1 7.1	4 9.8	22 5.3	
C									
Total	208 100	37 100	37 100	43 100	40 100	14 100	41 100	420 100	2.947

*Number of scores given by the group
**Percent of total scores for the group

Table IX. Number and percent of scores for the ability to manage and care for a cow properly before, during, and after calving. (Ability number 4).

Scores	Dairy-men	Heads of D.H. Depts.	Assoc. Profs.	County Agents	Exten. men	College Grads.	Herds-men	Total	Total Average Score
Zero					1 2.5			1 .3	
A	197* 94.7**	36 97.3	34 91.9	40 93.0	37 92.5	12 85.7	39 95.1	395 94.0	
B	11 5.3	1 2.7	3 8.1	2 4.6	1 2.5	2 14.3	2 4.9	22 5.2	
C				1 2.3	1 2.5			2 .5	
Total	208 100	37 100	37 100	43 100	40 100	14 100	41 100	420 100	2.931

*Number of scores given by the group
**Percent of total scores for the group

Table X. Number and percent of scores for the ability to adjust farm conditions to meet the needs for the kind of dairy business in which a person is engaged. (Ability number 11).

Scores	Dairy-men	Heads of D.H. Depts.	Assoc. Profs.	County Agents	Exten. men	College Grads.	Herds-men	Total	Total Average Score
Zero	1 .5							1 .2	
A	172* 82.7*	33 89.2	26 70.3	39 90.7	39 97.5	14 100	38 92.7	361 86.0	
B	33 15.8	3 8.1	10 27.0	4 9.3	1 2.5		2 4.9	53 12.6	
C	2 1.0	1 2.7	1 2.7				1 2.4	5 1.2	
Total	208 100	37 100	37 100	43 100	40 100	14 100	41 100	420 100	2.843

*Number of scores given by the group
**Percent of total scores for the group

Table XI. Number and percent of scores for the ability to provide desirable pasture for dairy animals.(Ability No. 16)

Scores	Dairy-men	Heads of D.H. Depts.	Assoc. Profs.	County Agents	Exten. men	College Grads.	Herds-men	Total	Total Average Score
Zero	2 1.0							2 .5	
A	175* 84.1**	26 70.3	29 78.4	38 88.4	34 85.0	8 47.1	36 87.8	346 82.4	
B	29 13.9	10 27.0	8 11.6	4 9.3	5 12.5	6 42.9	5 12.2	67 15.9	
C	2 1.0	1 2.7		1 2.3	1 2.5			5 1.2	
Total	208 100	37 100	37 100	43 100	40 100	14 100	41 100	420 100	2.815

*Number of scores given by the group
**Percent of total scores for the group

Distribution and Percent of Scores Given by all Groups of People

The number, distribution, and percent of total scores given to all abilities and understandings by the various groups of people is presented in Table XII. This table shows that an average of 43.5 percent of all of the ratings were "A"; 33.9 percent were "B" and 22.0 percent were "C".

The various groups of people are quite uniform in the percentage of "A", "B", and "C" ratings given, when they are compared with the average of the entire group.

If we consider the judgments of the people who rated the abilities and understandings as reliable, probably the most important ones should be among the first to be taught in general service courses. The less important ones could be organized into elective courses.

Table XII. Number, distribution, and percent of total scores given by the various groups.

Scores	Dairy-men	Heads of D.H. Depts.	Assoc. Profs.	County Agents	Exten. Men	College Grads.	Herds-men	Total
Zero	186*	24	8	44	27	8	41	358
	.61**	.4	.1	.7	.5	.4	.7	.6
A	14067	2254	1973	2588	2627	634	2730	26873
	46.0	41.4	36.3	40.9	44.7	30.8	45.3	43.5
B	10167	1798	1983	2089	1987	865	2041	20930
	33.3	33.1	36.5	33.0	33.8	42.0	33.9	33.9
C	6156	1363	1475	1600	1239	551	1215	13599
	20.0	25.1	27.1	25.4	21.0	26.8	20.2	22.0
Total	30576	5439	5439	6321	5880	2058	6027	61740
	100	100	100	100	100	100	100	100

*Number of scores given
**Percent of total scores for the group

General Service Courses

A general service course is designed to give training to the students from any department of the school who desire to get the essentials in dairy husbandry.

The abilities and understandings which ranked highest in the entire list apparently constitute the proper basis for general service courses, because they are of greatest importance to the general dairy farmer, according to the combined judgment of all the people who scored them. These should aid a student in actually doing the basal work of a dairy farmer. Even though he may leave school as a county agent, dairy extension man, or instructor, his training probably should not be fundamentally different from the training given to a dairy farmer.

The content of a course could not be prescribed for the entire country because of the many local situations which might influence the method of achieving the desired results. For example, in the West there is an abundance of alfalfa and wheat bran which makes the protein problem a small one for the dairy farmer. Their chief concern is that of supplying the necessary carbonaceous feeds. In the Middle West and East, where alfalfa or other leguminous hays are not so plentiful, supplying protein for the ration becomes very important. In these sections, concentrates high in protein are essential. One section of the country may have skim milk for calf feeding, while another section may resort to milk substitutes. Then

it is seen that the content of material must be adapted to meet the peculiar needs of different localities, although certain basic principles should be common to all.

Determining the Abilities and Understandings to be Included in the General Service Course

Thirty eight abilities and understandings were selected to make up the general service courses. The first 32 abilities and understandings were chosen in order of their importance. Six others, following the first 32, but not in exact descending order, were selected because they were so closely related to the first 32 that were chosen. The six abilities and understandings were numbers 34, 39, 41, 44, 47, and 49.

The 38 abilities and understandings contained more material than probably could be used in one course; therefore, the 18 most important ones were organized into the first general service course and the other 20 were organized into the second general service course. "The ability to care for and manage dairy bulls", which ranks number 25 on the list, is included in the first course with the first 17 of the list because it fits in with the selection of purebred sires.

The abilities and understandings in the first general service course were arranged in groups according to what appears to be a desirable teaching order. The instructor may, of course, teach them in the order best suited to his conditions. The abilities and understandings which are included in the first general service course are given here.

DAIRY PRODUCTION

(First General Service Course)

I DAIRY FARM MANAGEMENT

1. The ability to adjust farm conditions to meet the needs for the kind of dairy business in which a person is engaged. (11)*

II FEEDS AND FEEDING

2. The ability to provide desirable pasture for dairy animals. (16)
3. An understanding of the merits of different kinds of feeds. (13)
4. The ability to compute rations and determine costs for dairy animals. (12)
5. The ability to apply practical rules for feeding. (6)
6. The ability to feed the milking herd. (1)

III CARE AND MANAGEMENT OF BREEDING STOCK

7. The ability to feed and manage dairy heifers from six months of age until time for breeding. (7)
8. The ability to select pure bred sires. (3)
9. The ability to care for and manage dairy bulls. (23)
10. An understanding of the proper time to breed dairy heifers and cows. (15)

IV CARE AND MANAGEMENT OF COWS AND CALVES

11. The ability to manage and care for cows and heifers properly before, during, and after calving. (4)
12. The ability to raise calves that are fed by hand, using the kind of feeds that are available, such as whole milk, milk substitutes, calf meals, grain, etc. (5)
13. The ability to manage calves from birth until six months of age. (2)

V SANITATION

14. The ability to cool milk properly. (14)
15. The ability to clean and care for utensils used in handling milk. (9)
16. The ability to control satisfactorily bacteria in milk. (10)

VI DISEASES

17. The ability to manage successfully contagious abortion. (8)

18. The ability to establish a herd free from tuberculosis. (17)

*This number refers to the final rank of the ability or understanding.

Content of the First General Service Course "Dairy Production"

The subject matter to be taught in developing the abilities and understandings in the first general service course was next brought together from the master outline and other sources.

In some cases, not all of the subject matter necessary for the development of the ability or understanding sought could be found in the master outline. In such cases, the additional subject matter needed has been found elsewhere by the writer. On the other hand, the master outlines of general service courses submitted by the various institutions were found to contain a large amount of material apparently having no relationship to any ability or understanding included in either of the two general service courses here proposed.

The organization of subject matter to be taught in connection with the development of the respective abilities and understandings of the general service course, including such additional subject matter as was found, are on the following pages. A list of references for the material is also included.

1. THE ABILITY TO ADJUST FARM CONDITIONS TO MEET THE NEEDS FOR THE KIND OF DAIRY BUSINESS IN WHICH A PERSON IS ENGAGED

A. Essential material taught in college and found in the master outline which contributes directly to the development of this ability.

1. Adjusting farm condidtions to meet the needs for the kind of dairy business in which a person is engaged.

B. Additional material not listed in the outlines which should be included for the development of this ability.

1. Factors which affect farm adjustments
   (a) size of farm
   (b) soil
   (c) topography
   (d) climate
   (e) markets
   (f) transportation
   (g) location and distance from markets
   (h) labor supply
   (i) personal prejudices, likes and dislikes of farmer
   (j) each farm considered as an individual unit
2. Factors to consider in farm organization
   (a) utilization of land
   (b) distribution of labor
      1. man
      2. horse
      3. machinery

(c) minimize financial risks

1. provide several sources of income

(d) make most convenient

(e) economy of organization

(f) produce highest net return

3. Production factors

(a) power

1. horses

2. tractor

3. truck

(b) equipment

(c) farmstead

(d) field layout

(e) fertility

(f) taxes

(g) interest

(h) insurance

(i) tenancy

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2. THE ABILITY TO PROVIDE DESIRABLE PASTURE FOR DAIRY ANIMALS

A. Essential material taught in college which contributes directly to the development of this ability.

1. Analysis of pasture grasses
2. Value
   (a) pasture ideal for production
      1. provides an abundance of palatable feed
      2. provides a succulent feed
      3. provides a sufficient supply of protein, minerals, and vitamins
      4. provides moderate temperature and comfortable surroundings
3. Kinds of grasses or grass mixtures
4. Time to turn on pasture
5. Grain feeding on pasture
   (a) amount depends upon
      1. the production of the cow
      2. kind and nature of pasture
      3. condition of cow
   (b) experimental results
6. Providing for short pasture
   (a) silage versus soiling crops
      1. economy
      2. value
      3. disadvantages of silage
      4. experimental results

7. Changing from winter feeding to pasture

8. Factors influencing age and condition of animals to turn on pasture

B. Additional material not listed in the outlines which should be included for the development of this ability.

1. Characteristics of a good pasture

(a) location, convenience

(b) fences

2. Factors effecting the value of pastures

(a) seasonal variations of grasses

1. composition

2. time of season pasture can be used

(b) variation of forage on different types of soil

1. density

2. quality

(c) number of animals per acre

3. Management

(a) selection of suitable seed for pasture

(b) seeding and re-seeding

(c) cultivation

(d) fertilizing, trimming, and manuring

(e) weed control

1. mowing

2. burning

4. Grazing management and practice

(a) alternate grazing and resting

(b) mixed and successive grazing

(c) feed roughage before turning on pasture

5. Provide for emergency pasture

6. Problems requiring the care and management in providing desirable pasture

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3. AN UNDERSTANDING OF THE MERITS OF DIFFERENT KINDS OF FEEDS

A. Essential material taught in college which contributes directly to the development of this ability.

1. Roughages
   - (a) legume roughages dry
     1. alfalfa
     2. clovers
     3. soy-bean
     4. cow-pea
     5. mixed legumes
     6. others
   - (b) non-legume roughages dry
     1. corn fodder
     2. corn stover
     3. sorghum fodder
     4. straws
     5. millet
     6. others
   - (c) succulent feeds
     1. pasture
     2. silage
        - (a) corn
        - (b) pea
        - (c) kaffir
        - (d) sunflower
     3. roots

(a) carrots

(b) turnips

(c) beets

(d) mangels

(e) rutabaga

4. tubers

(a) potatoes

5. pumpkin

6. others

2. Concentrates

(a) grains

1. barley

2. corn

3. oats

4. wheat

5. rye

6. buckwheat

7. others

(b) leguminous seeds

1. soy beans

2. cow peas

(c) by-products

1. cotton-seed meal and cake

2. linseed meal and cake

3. soy bean oil meal

4. blood meal

5. cocoanut meal
6. peanut meal
7. gluten feed
8. gluten meal
9. hominy feed
10. distillers' grains
11. brewers' grains
12. fish meal
13. oat products
14. wheat bran
15. wheat middlings
16. buckwheat middlings
17. molasses
18. dried beet pulp
19. others

3. Commercial feeds
   (a) open formula
   (b) closed formula
   (c) laws regulating
4. Stock or tonic feeds

Characteristics of feeds and nutrients

1. Composition of feeds
   (a) water
   (b) dry matter
      1. ash or inorganic matter
      2. organic matter
         (a) protein

(b) carbohydrate

1. nitrogen free extract

2. fiber

(c) fat

(c) vitamins

2. Characteristics and values of nutrients

(a) proteins

1. source

2. uses

3. specific dynamic action

4. biological value

(b) carbohydrates

1. classes

(a) monosaccharide

(b) di-saccharide

(c) poly-saccharides

2. uses

(c) fats

1. uses

(a) energy

(b) vitamin carrier

(c) effect on product

(d) effect on metabolism

(d) minerals

1. values

2. results of deficiency

3. utilization

4. functions in body of animal

5. requirement

6. ratio of Ca:P

7. method of supplying

8. mixtures

(e) vitamins

1. classes

(a) A, B or B1, C, D, E, G or B2

2. requirements of dairy cattle

(a) vitamins synthesized by animal

3. Influence of feed on vitamin content of milk

3. Uses of feed by dairy cow

(a) maintenance

(b) growth

(c) fattening

(d) foetal development

(e) milk production

B. Additional material not listed in outlines which should be included for the development of this ability.

1. Note: The outlines presented such a wide variation in the classification of feeds and seemed to indicate a need of uniformity to a certain degree at least. With this in view, the classification of feeds as presented in Feeds and Feeding, 19th edition, by Henry and Morrison is recommended.

2. Classification

(a) concentrates

1. grain and seeds
2. by-products of grains and seeds
3. miscellaneous concentrates
4. milk and its products
5. slaughter-house by-products

(b) dried roughage

1. cured corn and sorghum forage, etc.
2. hay from the grasses
3. hay from the smaller cereals
4. hay from the legume
5. hay from mixed legumes and grasses
6. straw and chaff from the cereals
7. legume straws
8. miscellaneous dry roughage

(c) fresh green roughage

1. corn, the sorghums, etc.
2. fresh green grass
3. green fodder from the smaller cereals
4. green legumes
5. mixed legumes and grasses
6. roots and tubers, etc.
7. miscellaneous green forages

(d) silage

1. silage from corn, the sorghums, etc.
2. miscellaneous silage

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4. THE ABILITY TO COMPUTE RATIONS AND DETERMINE FEED COSTS FOR DAIRY ANIMALS

A. Essential material taught in college which contributes directly to the development of this ability.

1. Definition of terms
   - (a) feed
   - (b) carbohydrate
   - (c) fat
   - (d) protein
   - (e) food nutrient
   - (f) total nutrients
   - (g) digestible food nutrient
   - (h) ration
   - (i) balanced ration
   - (j) maintenance ration
   - (k) nutritive ratio
   - (l) carbohydrate equivalent
2. Factors of a good ration
   - (a) palatability
   - (b) variety
   - (c) bulk
   - (d) succulence
   - (e) balance of nutrients
   - (f) effect upon the animal
   - (g) effect upon the product
   - (h) economy

3. Ration requirements influenced by:
   (a) weight
   (b) yield of milk
   (c) quality of milk
   (d) stage of lactation
   (e) age
   (f) condition
   (g) individuality of cow
   (h) covering of body and shelter
   (i) season or climate
4. Use of feed
   (a) maintenance
   (b) milk production
   (c) growth
   (d) fetus
   (e) fattening
5. Calculating rations
   (a) total digestible nutrients
   (b) high in protein
   (c) low in protein
   (d) determine percent of digestible protein in feed or mixture
   (e) hays
      1. legume hays alone
         (a) with grains
      2. non-legumes alone
         (a) with grains

3. succulent feeds alone

(a) with grains

(f) other roughages

1. with grain

2. with succulent

3. with grains and succulents

(g) with minerals

(h) for herd

(i) for maximum production

(j) for test cows

(k) for economic production

6. Determination of costs of feeds

B. Additional material not listed in the outlines which should be included for the development of this ability.

1. Determination of costs of feeds

(a) grain mixture

(b) dry roughage

(c) succulent roughage

(d) minerals

(e) pasture

2. Problems in planning rations and determining feed costs for dairy animals.

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5. THE ABILITY TO APPLY PRACTICAL RULES OF FEEDING

A. Essential material taught in college which contributes directly to the development of this ability.

1. Amount of feed of different classes varies with quality of production
   (a) concentrates
   (b) roughages
   (c) succulent feeds
   (d) minerals
2. Variety
3. Palatability
4. Home grown
5. Uses of different classes of food in ration
6. Concentrates substituted for others
7. Feed balanced feeds
8. Use feeding standards as guides
9. When to supply feeds high or low in protein
10. Feed in summer
11. Feeding in winter
12. Feeding on pasture
13. Water in feeding
14. Apply practical rules
15. Economical feeds

B. Additional material not listed in the outlines which should be included for the development of this ability.

1. Problems in applying practical rules of feeding

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6. FEEDING THE DAIRY HERD

A. Essential material taught in college which contributes directly to the development of this ability.

1. Selection of feed
   (a) physiological requirements
      1. effect of fiber
   (b) economy
      1. using home grown feeds
      2. as measured in quality and quantity of food units
2. Preparation of feed
   (a) harvesting
   (b) grinding (concentrates)
   (c) cutting (roughage)
3. Feeding suggestions
   (a) concentrates
      1. unsuitable grains
      2. carbonaceous
         (a) mixtures
         (b) coparative value
      3. protein
         (a) value of roughage
            1. hay
            2. silage
   (b) roughages
      1. legume
         (a) adequacy without grain

2. non-legume

(a) value in ration

(b) advisability

(c) protein and mineral requirements

3. succulent feeds

(a) silage

1. advantages and disadvantages

(b) soilage

1. cost

2. method of feeding

3. suitable crops

(c) roots, tubers, pumpkins

(c) commercial feeds

1. advantages and disadvantages

(d) tonic feeds

1. values

2. when to feed

4. Individual versus herd feeding

(a) advantages and disadvantages

5. Summer feeding

(a) kind of feed

(b) supplementary feeds

(c) providing for short pasture

1. summer silo

6. Winter feeding

(a) attempt to imitate summer feeding

1. provide vitamins

2. provide succulence

(b) economical use of feeds

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7. THE ABILITY TO FEED AND MANAGE DAIRY HEIFERS FROM SIX MONTHS OF AGE UNTIL FRESHENING

A. Essential material taught in college which contributes directly to the development of this ability.

Care and management of the dairy heifer

1. Shelter
2. Breaking to lead
3. Grooming
4. Clipping
5. Trimming hoofs and horns
6. Dehorning
   (a) methods
   (b) holding animals
7. Training of horns
   (a) types of trainers
8. Age to separate bulls and heifers
9. Types of pens
10. Sanitation
    (a) buildings
    (b) pens
11. Diseases
12. Growth
    (a) normal
    (b) measuring
    (c) limits
    (d) internal causes
    (e) factors effecting

1. age at first calving
2. gestation
3. size at birth
4. lactation
5. breed
6. weight at various ages
7. nutrition and liberality of ration
8. heat, light, and ventilation

13. Recovery from retarded growth
14. Factors influencing the age of sexual maturity
15. Influence of ration on breeding qualities
16. Sterility of heifers

Feeding dairy heifers

1. Quantities to feed at different ages
2. Influence of ration during growing period on dairy qualities and type
3. Feed for summer
4. Feed for winter
5. Classes of feeds for heifers
   (a) concentrates
   (b) roughages
   (c) succulents
   (d) minerals
   (e) vitamins
6. Values of each class for dairy heifers
7. Proportions and amounts of feeds for heifers

8. Practical rations for heifers

9. Water for heifers

10. Self feeders

11. Pastures

B. Additional material not listed in the outlines which should be included for the development of this ability.

1. When to raise or buy heifers

2. Problems requiring planning in feeding and in managing dairy heifers

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8. AN UNDERSTANDING OF THE IMPORTANCE OF SELECTING PUREBRED SIRES

A. Essential material taught in college which contributes directly to the development of this ability.

1. Importance of selection of sire
2. Age of bull to select
3. Factors to consider
4. Value of bull as compared to cow
5. Importance of pure bred sire
   (a) in grade herd
   (b) pure bred herd
   (c) results of use
   (d) compared to grade
6. Wide variation in prepotency of bulls
7. Proven sire
   (a) meaning
   (b) value
   (c) method of proving
   (d) number of daughters necessary to prove bulls

B. Additional material not listed in the outlines which should be included for the development of this ability.

1. Factors to consider in selection of sire
   (a) performance and type of offspring
   (b) pedigree
      1. production records of offspring
      2. production records of full sisters and half sisters

3. production records of dam
4. production records of sire's daughters and sisters
5. production records of grand-dams
6. production records of grand-daughters
7. uniformity of production
8. popularity of blood lines

(c) type

(d) price

2. Problems involving the selection of pure bred sires

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9. THE ABILITY TO CARE FOR AND MANAGE DAIRY BULLS

A. Essential material taught in college which contributes directly to the development of this ability.

1. Importance of proper management
2. Necessity of proper handling while young
   (a) handle in kind but firm manner
3. Feeding during the growing period
4. Age for breeding
5. Amount of service permitted
6. Ringing
   (a) purpose
   (b) methods
   (c) age
7. Dehorning
   (a) values
8. Feeding the mature bull
   (a) for light or heavy service
   (b) during season
   (c) at various ages
   (d) importance of liberal feeding
   (e) dangers of over or underfeeding
9. Staff
   (a) when to use
   (b) types
10. Disposal of bulls
   (a) reasons

(b) when

(c) where

11. Keeping breeding records

12. Exercisers for bulls

(a) types

(b) value of exercise for bulls

13. Housing the bull

14. Bull pen

(a) location

(b) size

(c) type

(d) breeding stall

(e) plans

1. for several bulls with one breeding stall

15. Disinfection

(a) pens

(b) bulls

1. after breeding questionable cows

B. Additional material not listed in the outlines which should be included for the development of this ability.

1. Careful consideration essential before disposal to determine value of progeny

2. Dangers of permitting one or more bulls to run with herd

3. How, when, and where to secure bulls

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10. AN UNDERSTANDING OF THE BASIC FACTS TO BREED DAIRY HEIFERS AND COWS

A. Essential material taught in college which contributes directly to the development of this ability.

1. Age at first bulling
2. Age to breed
3. Influence of age
   (a) persistency of milking
   (b) dairy qualities
   (c) type
4. First calving
   (a) breed variations
   (b) effect of calving on growth
      1. early calving
      2. late calving
      3. height
      4. weight
5. Fall versus spring calving
6. Influence of ration on breeding qualities
7. Growth
   (a) factors affecting
8. Drying off the cow
9. Influence of dry period
10. Oestrus cycle

B. Additional material not listed in the outlines which should be included for the development of this ability.

1. Condition of animal

2. Relation to disease control
3. Previous lactation period
4. Time of breeding depends upon purpose at time of freshening:
   (a) use of animals for milk production
   (b) to secure new breeding stock
   (c) to provide show animals
5. Economic considerations for cows' freshening
   (a) value of product to be sold
   (b) value of animals
      1. parentage
      2. new born
   (c) cost of feed
   (d) labor costs
   (e) facilities of calving for cow at time of calving depending upon:
      1. local conditions
         (a) kind of barns and equipment
         (b) seasonal temperatures
6. Problems in planning when heifers should be bred

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11. THE ABILITY TO CARE FOR A COW BEFORE, DURING, AND AFTER CALVING

A. Essential material taught in college which contributes directly to the development of this ability.

1. Determination of pregnancy
2. Care before calving
   (a) condition
   (b) breed
   (c) heifer
   (d) cow
3. Milking before calving
4. First calving
   (a) breed variation
   (b) effect of calving on growth
      1. early calving
      2. late calving
      3. height
      4. weight
   (c) age
5. Calving time
   (a) care
   (b) place of calving
   (c) duties of attendant
   (d) indications of calving
   (e) cleanliness
   (f) normal position of calf
   (g) difficult calving

1. mangement

(h) dead calves

6. After calving

(a) calf

1. care

2. navel disinfection

3. nursing

(b) cow

1. feed and water

2. care

3. retention of afterbirth

4. guarding against milk fever

5. placing cow with herd

6. time to breed

(c) sanitary precautions

1. disease control

B. Additional material not listed in the outlines which should be included for the development of this ability.

1. Problems requiring planning to care for a cow at time of calving

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12. THE ABILITY TO RAISE CALVES THAT ARE FED BY HAND, USING THE KIND OF FEEDS THAT ARE AVAILABLE SUCH AS WHOLE MILK, MILK SUBSTITUTES, CALF MEALS, GRAIN, ETC.

A. Essential material taught in college which contributes directly to the development of this ability.

1. First feeding from dam; value of colostrum
2. Whole milk
   (a) amount
   (b) quality
   (c) temperature
   (d) method of changing to skim
   (e) importance of sweet milk
   (f) compared with skim
3. Milk substitutes
   (a) whey
   (b) buttermilk
   (c) skim-milk powder
   (d) dry and semi-solid buttermilk
   (e) calf meals
      1. commercial
      2. home mixed
      3. experimental
4. Supplements to milk and milk substitutes
5. Keeping utensils clean
6. Roughages for calves
   (a) hay
   (b) pasture

7. Concentrates for calves

   (a) age

   (b) amount

8. Water

9. Preparation of feeds

B. Additional material not listed in the outlines which should be included for the development of this ability.

1. Changes in feeding schedule should be made gradually

2. Protection from draughts and cold

3. Feeding calves economically

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.3. THE ABILITY TO MANAGE CALVES FROM BIRTH UNTIL SIX MONTHS OF AGE

A. Essential material taught in college which contributes directly to the development of this ability.

1. Importance of raising calves
2. Economic consideration
   (a) need about 3 heifer calves yearly for 10 cow herd
3. Importance of regularity of feeding
4. Methods of raising
   (a) with mother
   (b) on nurse cow
   (c) by hand
      1. feeding schedule
         (a) on milk
         (b) on milk substitutes
   (d) self-feeders for calves
5. Methods of obtaining calves for farm
   (a) raising
   (b) buying
   (c) having others raise them for you
6. Care of calf at birth
7. Birth weight of calves
8. Taking calf from mother
9. Teaching calf to drink
10. Cost of raising calves
11. Growth

(a) nutrients required

(b) rate expected

(c) affected by birth at various seasons

12. Uses of classes of feeds for calves

(a) carbohydrate

(b) fats

(c) proteins

(d) minerals

(e) vitamins

13. Weaning calves

14. Marking, tattooing, dehorning

15. Pens and ties for calves

16. Sanitation

(a) buildings

(b) pens

B. Additional material not listed in the outlines which should be included for the development of this ability.

1. Determination of which calves should be raised or destroyed

(a) basis of determination

2. Effect of bulky feeds

3. Avoid over-feeding

4. Salt and water for calves

5. Yarding for calves

6. Exercise

7. How to raise at minimum cost

8. Problems requiring planning in managing c lves from birth until six months of ge

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14. THE ABILITY TO COOL MILK PROPERLY.

A. Essential material taught in college which contributes directly to the development of this ability.

1. Methods of cooling
   (a) water
   (b) ice
      1. natural
      2. artificial
   (c) location of cooler
   (d) construction
   (e) insulation
   (f) size
2. Effect of cooling on quality

B. Additional material not listed in the outlines which should be included for the development of this ability.

Cooling milk

1. Cooling milk practices
   (a) morning
   (b) night
2. Germicidal properties of milk
   (a) duration
   (b) value
3. Pasteurizing
   (a) method
   (b) values
4. Temperature for cooling

(a) optimum

(b) effect of various temperatures on bacterial growth

5. Aeration in relation to cooling

6. Tubular coolers

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15. THE ABILITY TO CLEAN AND CARE FOR UTENSILS USED IN HANDLING MILK

A. Essential material taught in college which contributes directly to the development of this ability.

1. Cleaning utensils
   (a) use of washing powder
   (b) sterilization
      1. heat
         (a) steam
         (b) air
         (c) water
      2. chemicals
   (c) care of utensils and equipment between milkings

B. Additional material not listed in the outlines which should be included for the development of this ability.

1. Necessity of thorough cleaning
2. How utensils are washed
3. Wash room in relation to cleaning utensils
4. Sterilizing equipment
5. Types of heat sterilizers
   (a) steam boiler
   (b) oil furnaces
   (c) self-contained kerosene burner
   (d) gas burner
   (e) gasoline
   (f) steam electric
   (g) hot air

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16. THE ABILITY TO CONTROL SATISFACTORILY BACTERIA IN MILK

A. Essential material taught in college which contributes directly to the development of this ability.

1. Importance of bacteria
   (a) medical standpoint
   (b) keeping qualities of milk
2. Kinds of bacteria and habits of growth
3. Division into general groups
   (a) acid coagulators
   (b) alkali producers
   (c) liquefiers
   (d) digestors
   (e) gas formers
   (f) disease producers
4. Classification of bacteria
   (a) normal
      1. types involved
      2. changes produced
   (b) abnormal bacteria
      1. ropy or slimy milk
      2. gassy milk
      3. sweet curdling milk
      4. bitter milk
      5. salty milk
      6. red milk
      7. blue milk

8. yellow milk

(c) pathogenic bacteria

1. diseases most commonly carried in milk

(a) tuberculosis

(b) typhoid fever

(c) scarlet fever

(d) septic sore throat

(e) dysentery

5. Sources of bacteria in milk

(a) interior of udder

(b) exterior of udder

(c) barn air

(d) utensils

(e) milkers

6. Methods of destroying bacteris

7. Methods of controlling bacteria on farms and in dairy herds

B. Additional material not listed in the outlines which should be included for the development of this ability.

1. Factors influencing:

(a) flavor

(b) odor

2. Division

(a) Thermophile - grow at high temperatures

(b) Psychroplile - grow at low temperatures

3. Pasteurization

(a) value

(b) methods

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17. THE ABILITY TO MANAGE SUCCESSFULLY CONTAGIOUS ABORTION

A. Essential material taught in college which contributes directly to the development of this ability.

1. Cause
2. History
3. Occurrence
   (a) U. S.
   (b) European countries
4. Animals affected
   (a) cattle
   (b) hogs
5. Susceptibility
6. Mode of infection
7. Transmitted to man
   (a) Malta, Bang, or Undulant fever
      1. how transmitted
      2. severity
      3. symptoms
8. Prevention
9. Control
   (a) immunization
10. Care and management
   (a) negative herd
   (b) positive herd
   (c) Bang's method

B. Additional material not listed in the outlines which

should be included for the development of this ability.

1. Causes
   (a) organisms
      1. Bang
      2. others
         (a) Streptococcus
         (b) Spirillum
   (b) other causes
      1. injury
      2. feed
      3. miscellaneous
2. Symptoms
   (a) abortion
   (b) retained placenta
   (c) weakness of calves at birth
3. Diagnosis
   (a) blood test
4. Control
   (a) isolation
   (b) use of maternity stalls
   (c) care of calf from infected dam
   (d) cleaning up
5. Close confinement versus open territory for range or pasture
6. Secure services of competent veterinarian
7. Problems in planning the eradication of contagious abortion from the herd

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THE ABILITY TO ESTABLISH A HERD FREE FROM TUBERCULOSIS

A. Essential material taught in college which contributes directly to the development of this ability.

1. Importance
2. General nature of disease
3. Cause
4. History
5. Occurance
   (a) U. S. compared to other countries
6. Parts of body attacked
7. Symptoms
8. Transmitted to man and other animals
   (a) how
9. Eradication
   (a) United States
   (b) State laws
10. Payment of indemnities
11. Area of testing
12. Accredited herds
13. Tests
   (a) tuberculin
   (b) intradermal
   (c) B. C. G.
   (d) limitations of test
   (e) cost of testing
   (f) objections

(g) advantages

(h) effect on cows

(i) cleaning up after tests

B. Additional material not listed in the outlines which should be included for the development of this ability.

1. Immediate eradication most economical
2. Method of infection
3. Method of eradication
4. Post-mortem appearances of animals
5. Marking tubercular animals
6. Laws
   (a) effecting interstate shipments of animals
   (b) relating to control of disease

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Abilities and Understandings Included in the Second General Service Course

The second general service course which is recommended, is made up of 20 abilities and understandings, following those included in the first course. These are grouped under six main headings. Abilities and Understandings from number 16 to 32 in order of rank are included, save that number 23, which was included in the first course, is omitted here. Beyond number 32, six additional abilities and understandings have been selected, which were not in consecutive order. These are numbers 34, 39, 41, 44, 47, and 49. They were chosen because they were very closely related to others within the group.

The development of the course would be made in the same manner as the first course, although the content for the course is not included here.

The abilities and understandings not included in the first and second courses could be grouped in other elective course to be given to students who desire additional training in dairy production. The abilities included in the second general service course designated as "Feeding, Care, and Management", are presented here.

FEEDING, CARE, AND MANAGEMENT OF DAIRY CATTLE

(Second General Service Course)

I STARTING THE DAIRY HERD AND SELECTION OF A BREED

Rank

24. The ability to determine the best method of starting or increasing the dairy herd.
39. The ability to select a breed appropriate for a given condition.

II MANAGEMENT

18. The ability to buy and sell animals and dairy products to the best advantage.
19. The ability to select dairy animals from their production records.
20. The ability to control, with a fair degree of success, the factors that influence milk production.
29. The ability to determine the cost of producing milk, based upon feed, labor, buildings, depreciation, replacements, etc.
31. An understanding of the importance of gentleness in handling dairy animals.

III SIRES

30. The ability to rate the breeding worth of a bull from the performance of his ancestors, from his own individuality, and from the performance of his progeny.(bull index).
47. The ability to provide proper equipment for handling the bull.

IV FEEDS AND FEEDING

21. The ability to feed the dry cow.
26. The ability to supply water to the dairy herd in a manner that is most advantageous to the animals throughout the year.
28. An understanding of the proper food and amount of mineral to feed a cow.
32. The ability to feed the bull.
34. The ability to determine the amount of feed that will be required for a year's time.
41. An understanding of the results to be expected when animals are fed all they will possibly eat.
44. The ability to prepare feed for dairy animals by grinding, chopping, soaking, etc., that will give the best results in feeding.
49. The ability to determine desirable commercial feeds.

V SANITATION

22. The ability to maintain proper sanitary conditions around the dairy farm.

VI DISEASES

25. An understanding of the nature of the minor diseases or ailments of dairy cattle and an ability to give first-aid treatment.
27. An understanding of diseases and ailments that particularly attack calves and to know their methods of treatment.

SUMMARY

1. Content was obtained from the literature and from the course outlines of dairy production classes in the agricultural colleges.

2. Letters were sent to the heads of the dairy husbandry departments to obtain the following:

   (a) the cooperation of the dairy husbandry department

   (b) names of people interested in dairying who would answer a questionnaire

   (c) outlines of courses in dairy production

3. Forty nine outlines in dairy production were received from seventeen colleges.

4. All of the content in the outlines which were received from the schools was organized into one outline called the "Master Outline." Fifteen main headings with sub-headings were used in the master outline. Any particular point was recorded but once, even though it was found in several outlines.

5. Material was selected from the master outline (1) on the basis that it would develop "abilities" on the part of the individual to do certain kinds of activities or jobs, (2) on the basis of "understandings" of certain principles, laws, or truths that a person should know in order to solve the problems of a dairy farmer.

6. There were 147 abilities and understandings determined

from the master outline and placed in a questionnaire to be rated "A", "B", or "C" by a group of dairy specialists whose names were secured from heads of dairy husbandry departments throughout the United States.

7. Abilities and understandings in the questionnaire were rated "A" when the ability or understanding was absolutely necessary for success to a general dairy farmer; they were scored "B" when they were important but not necessary; they were scored "C" when they were of minor value.

8. Twenty nine heads of dairy husbandry departments submitted 628 names of people to whom questionnaires were sent.

9. There were 420 people from 45 states in the following groups of people scoring the questionnaire: 208 dairymen, 43 county agents, 40 dairy extension men, 14 college graduates, 37 heads of dairy husbandry departments, and 37 associate professors.

10. Abilities and understandings were listed in order of importance according to the average ratings made by all scorers.

11. The agreement as to percentage of "A", "B", and "C" scores given by all groups of people scoring single abilities and understandings shows uniformity and consequently reliability of scoring by the different groups of people.

12. The combined scores of all people show that 43.5 percent of all abilities received a score of "A", 33.9 percent a score of "B" and 22.0 percent a score of "C".

13. Forty eight abilities and understandings or 32.6 percent of all, received an average rating of less than 2; i. e. "B". This means apparently that approximately one-third were regarded by the majority as not really important to practical dairymen.

14. The most important abilities and understandings are organized into general service courses; the less important ones should apparently be placed in elective courses.

15. The content of material must be adapted to local community needs.

CONCLUSIONS

1. General agreement as to the relative importance of the various abilities and understandings related to dairy production was shown among those most competent to judge such matters.

2. There is need of organizing general service courses in dairy production upon the basis of the abilities and understandings which are generally regarded as most important by many competent judges.

3. Abilities and understandings not included in the general service courses can be organized into elective courses for students who desire to get additional information in dairy production.

4. Much material is now being taught which does not contribute to the really important abilities and understandings.

5. A considerable amount of the subject matter essential to the development of the really important abilities and understandings in dairy production is included in few, if any, of the outlined general service courses taught at the present in land grant institutions.

ACKNOWLEDGEMENT

The writer wishes to acknowledge his indebtedness and to extend his sincere appreciation to Dr. C. Y. Cannon, Head of the Dairy Husbandry Department, and to Professor W. H. Lancelot, Head of the Vocational Education Department, for their encouragement and criticisms of this study.

The author also extends thanks to the staff members from the Dairy Husbandry and Vocational Education Departments. The author also appreciates the cooperation given him by the Heads of the Dairy Husbandry Departments in the colleges and to the many people throughout the United States who checked and returned the questionnaire, in order that this study might be made possible.

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Note: U. S. Fed. Board for Vocational Education--see Fed. Board for Vocational Education.

APPENDIX I

ADDITIONAL ABILITIES AND UNDERSTANDINGS SUGGESTED BY THE PERSONS SCORING THE QUESTIONNAIRE

(The number in parenthesis indicates the number of persons making the same suggestion.)

1. "An ability to select and grow the kind of crops that fit most economically into a particular dairy program."
2. "An ability to determine the profit or loss made by each animal in the herd each year."
3. "An ability to determine the value of each member of the herd as a progenitor for future generations."
4. "An ability to select the kind and proper amount of machinery and equipment for the economical operation of the dairy farm business. (2)
5. "An ability to make rope halters, throw and ring the bull."
6. "An understanding of the financing of the dairy farm."
7. "An ability to determine the point at which a cow is unprofitable, taking into consideration profit over feed, cost with age, and minor ailments."
8. "An ability to have cows milked thoroughly dry at every milking."
9. "An ability to handle bloat."
10. "An ability to with-hold medicines from sick animals unless one is absolutely sure they will be beneficial."
11. "An ability to hire and handle men. (3)
12. "An ability to manage and execute all the associated farm duties on a dairy farm in order to keep a regular schedule for daily work, feeding, and milking."

13. "An ability to keep a cow clean."
14. "An understanding of individual milk records where Herd Improvement tests are not available.
15. "An ability to adapt size of herd to size of farm, feed supply, and condition of market."(2)
16. "An understanding of the fact that hard work, patience, and kindness to cattle is necessary to succeed as a dairyman."
17. "An ability to properly milk a cow."
18. "An ability to analyze adversities and their causes."
19. "An ability to think and use common sense."
20. "An understanding of the importance of personal cleanliness and habits."
21. "An ability to raise one's own feed." (2)
22. "An ability to know and to produce roughages best adapted to local conditions."
23. "An ability to read dairy literature."
24. "An ability to secure the desired information in reading."
25. "An ability to detect and control mastitis."
26. "An ability to keep a cost accounting record of the dairy enterprise separate from the complete farm business."
27. "An ability to correlate factors essential to successful dairy farming."
28. "An ability to determine breeding troubles."
29. "An understanding of the advantages of fall freshening."
30. "An understanding of the value and uses of skim milk."

31. "An understanding of the values of proven sires."

32. "An understanding of the fact that dairymen are born, not made."

MISCELLANEOUS SUGGESTIONS

1. Factors which would cause the questionnaire to be scored differently
   (a) if the person was a breeder of pure bred cattle (19)
   (b) if scored for past, present, or future conditions
   (c) local conditions (4)
   (d) market outlet (3)
   (e) biased opinions
2. Subjects which should be taught to college students
   (a) breeder of purebred cattle should learn more in college than the general dairy farmer (3)
   (b) economy and building of herd
   (c) all science effecting various angles of dairy industry
   (d) discourage plunging into dairying; grow into it
   (e) all abilities and understandings in questionnaire (4)
   (f) other courses than ones for dairy farmer
   (g) proper balance between dairy herd and required seed crops (2)
3. Factors which add to the success of the dairy farmer
   (a) man's love for good dairy cattle (4)
   (b) knowing a good cow and how to feed and care for her
   (c) breeding own cattle or buying carefully when necessary
   (d) buying from reliable breeder (2)
   (e) sanitation (3)

(f) using an abundant supply of home grown feed and a good bull

(g) practical knowledge of dairy farming (5)

(h) purebred cattle are not necessary if dairyman uses a good bull

(i) experience, honesty, and reliability are the dairyman's best assets

4. Factors which detract from success

(a) lack of pasture

(b) too much use of medicines

(c) abortion, tuberculosis, or gargot in the herd

(d) raising calves where land is high in value

(e) misrepresentation of a product to make a sale

5. Judging cattle and the show ring

(a) dairy shows should stress production

(b) average dairy farmer should devote time to dairy problems, not to the show ring

(c) training on judging team is valuable

6. Study of dairying for dairy farmer and future dairy farmer

(a) questionnaire furnishes an incentive to study to the general dairy farmer

(b) ambitious student should have plenty of work; unambitious student should not be in school

(c) student wastes his time in going to college to prepare to be a general dairy farmer with a small herd

(d) college training is not necessary; dairying can be learned by experience

(e) if questionnaire is answered, the dairy farmer learns new things

7. Use of questionnaire by professors in dairy husbandry

(a) due to large number of questions asked, professors may be able to check up on duplication in different courses (3)

(b) questionnaire could be used in discussion and as a reference (5)

8. Factors which determine worth of the dairy animal

(a) daughters of a bull determine his worth more than his ancestors or his show ring record (3)

(b) records are more important than type

(c) what the cow does herself--production and reproduction--are the important things; pedigrees don't count